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INDIA – THE LAND AND PEOPLE

COMMON TREES

DR. H. SANTAPAU
DIRECTOR
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FOREWORD

THIS IS another addition to the Series that the National Book Trust has planned on "India – the Land and People".

The origin of the Series is the result of a discussion that I had with the late Prime Minister, Pandit Jawaharlal Nehru. When I first put the idea before him, he not only heartily approved it but gave many suggestions for making it more complete and attractive. It was his opinion that such a Series of books on India will form a permanent library of knowledge on every aspect of this country and is sure to make constructive contribution for national advancement in knowledge and education.

The Series proposes to cover every aspect of the country and will deal with its geography, geology, botany, zoology, agriculture, anthropology, culture, language etc. Its ultimate aim is to create a kind of comprehensive library of books on India. We have endeavoured to have the books written by acknowledged authorities on various subjects and in a scientific way. Every effort is being made to see that they are easily understandable by the ordinary educated reader. The factual knowledge regarding the various subjects concerning India would be available to any ordinary reader who is not a specialist and who would like to have a knowledge of the subject in a relatively simple language.

We have been fortunate in getting the guidance of leading experts and scientists in various fields for this Project. In fact without their active co-operation it would not have been possible to plan the Series. We are thankful to our Board of Honorary Editors who are eminent specialists and leaders in their field for helping us in producing these volumes for the benefit of the ordinary reader.

One of the objects of the Series is to make it available in as many Indian languages as practically possible. The work of translating them in various languages will be taken up as soon

as the original books are ready. In fact a few volumes might be originally written in some of the languages.

We have received full support from the Ministry of Education of the Government of India and the State Governments. They are lending their help in many ways not the least by permitting scientists working under them to write for the Series. I would like to take this opportunity of thanking them. Without their help it would not have been possible to undertake this enterprise of national utility.

I am very grateful to my colleague, Professor M. S. Thacker, Member of the Planning Commission, for agreeing to be Co-Chief Editor. His enthusiastic collaboration has greatly helped in planning the Series successfully.

NEW DELHI
May 12, 1966

B. V. KESKAR

INTRODUCTION

THE BOOK that is here presented to the public owes its inspiration to a request by Shri J. John, the Editor of *State Transport Review* of Bombay, who pressed me to contribute a series of articles of a popular nature on some of the trees of Bombay. This was done, the first number appearing in May, 1958; the last number in the series came out in November, 1960, after which the journal itself was discontinued in favour of another journal in the regional language.

In the introductory note to the first article of the series, the Editor stated: "This is the first of a series of short notes and illustrations, which we intend publishing from time to time. We shall select trees or climbers, which on account of their showy flowers and foliage deserve a place in gardens and avenues... This series, it is hoped, would encourage both the S(tate) T(ransport) personnel and the general travelling public to a greater appreciation of the beauties of nature."

Most of the articles of the Bombay series are reproduced in these pages suitably adapted; a few climbers and shrubs have been left out. On the other hand a fairly good number of new trees have been added in this book. In general only such trees have been included that may be seen planted along the streets of our towns or along the roads of the country; trees found only in gardens or in the forest have on purpose been omitted.

This book is not meant for professional botanists or foresters; it is intended to give our educated public some information on the commoner road-side or avenue trees of peninsular India. Technical terms have been reduced to the minimum and they have been fully explained. In the selection of details, I have tried to pick up those that in my opinion have been found of interest to our reading public. Most of the trees here discussed are indigenous in some part or other of India; only a few exotics have been taken up, they are trees that have become so common

all over the country and have adapted themselves so well to Indian conditions that they may be considered if not indigenous, at least fully naturalized.

The original series was written for a Bombay journal and for the Bombay public; for this reason efforts were made to give information that was considered of particular interest to the people of Bombay. In the present book the range of details has been extended to cover most of India south of the Himalayas.

Some friends, that have seen the MS. of this book, have asked me to explain the reason if any, for the inclusion of some trees and rejection of others; there seem to be some indigenous trees that are by any standard much more showy and attractive than some of those listed here. I may honestly confess that no philosophical reason has guided me in my choice of subject. For many years I have been moving about India looking at our trees; some have caught my fancy, and here they are in this book. Or some friend may have called my attention to some striking trees and asked for details; such trees are also included. In general I have taken up trees found only in peninsular India away from the Himalayas or from the more remote parts of Assam, that is to say, trees with which our public may be expected to be more or less familiar.

One word about the illustrations. All the colour blocks, with the exception of *Plate 10*, have been prepared from original water-colour paintings by A. K. Gohel, who executed his work in Bombay under a scheme financed by the Council of Scientific & Industrial Research, New Delhi. *Plate 10* is based on a water-colour painting by R. A. Eklund of Purandhar, now of Finland. The half-tone illustrations have been taken with permission from the book *The Palms of British India and Ceylon* by E. Blatter, published by Oxford University Press. The line diagrams, with the exception of *Plates 1* and *11 b* have been especially drawn for this book by Shri D. P. Deb, an artist of the Botanical Survey of India, Calcutta. *Plate 11 b* has been based on a photograph by the author.

Plate 1 has been based on a photograph by Dr. T. A. Rao of the Botanical Survey of India, Calcutta. My sincere gratitude goes to all the artists and to Oxford University Press.

I take this opportunity to acknowledge my great indebtedness to Shri J. John, the Editor, and the State Transport authorities of Bombay, with whose permission the original series published under the name "*Know Your Trees*" is here reproduced; my indebtedness is all the greater for the fact that they have allowed me the use of many of their own colour blocks, and in this way have reduced the cost of this publication. I also express my gratitude to Sri K. S. Srinivasan, Dy. Director, Botanical Survey of India, who has helped in the preparation of the line illustrations.

H. SANTAPAU

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1. THE BAOBAB OR MONKEY-BREAD TREE

ADANSONIA DIGITATA Linn.

(*Family:* Bombacaceae)

THE BAOBAB has been known in India for many centuries; Muslim traders are credited with their introduction and dispersal in our country from tropical Africa, where the tree is indigenous. At present the Baobab is found scattered all over India, at Calcutta, Lucknow, Madras, etc., but it is particularly along the western coast of India that the tree is common. In the last few years, I have noted this tree at Bassein; in the neighbourhood of a Christian church at Condita in Salsette Island, where the trees were said to have been planted in the sixteenth century by the Missionaries in charge of the church. At the entrance of Victoria Gardens there is a good specimen, standing, as it were, on sentry duty to watch over the visitors entering the Gardens. Several good trees can be seen in a number of places all over Salsette Island.

NAMES

The scientific name of the tree is *Adansonia digitata* linn. The name *Adansonia* commemorates the 18th century French botanist M. Adanson; *digitata*, meaning 'finger-like' refers to the shape of the leaf. The various English names refer each to one or more of the striking characteristics of the tree; it is called the *African Calabash Tree*, with reference to the shape and size of the fruit; it is also called *Cream of Tartar Tree*, with reference to the pulp of the fruit; the *Monkey-Bread Tree*, obviously with reference to the fact that monkeys eat the fruit with apparent relish; the vernacular name in some parts of Africa is *Baobab*, which name has been accepted in English. In India the tree is known as *Choyarichich*, *Gorakhaamli*, *Gorakh Chinch*, etc.

Description

This is a strange looking tree; formerly it was cultivated near houses, temples, etc. The great size attained by the trunk makes it unsuitable for planting along modern streets; in the past it was cultivated perhaps on account of its strange looks and of the medicinal value of most of its parts. A soft-wooded tree; the trunk is about the thickest in the world, grotesquely fat, suddenly tapering into thick branches; in those parts of tropical Africa, where the tree is indigenous, the trunk is reported as reaching 10 meters or more in diameter, and this makes the trunk about 30 m. in girth; to give an idea of what this girth means, it is enough to say that it would take 14 or 15 tall men spreading their arms fully to encircle the trunk of this tree. Another striking feature of the Baobab is its supposed venerable old age; Adanson himself calculated that a large tree he noticed

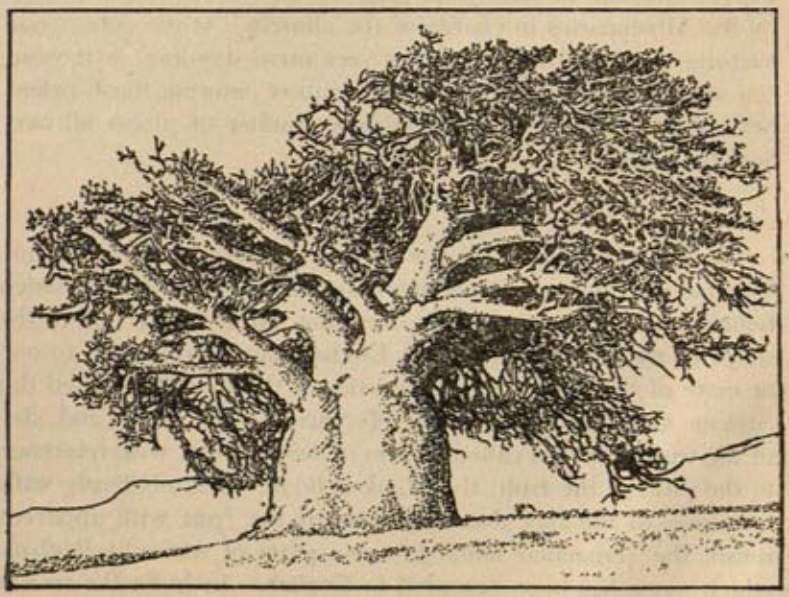

Plate 1. THE BAOBAB *(Adansonia digitata* Linn.*)*

in Africa was over 5,000 years old; the same author remarked that he had seen in Africa some trees on the bark of which visitors had carved their names in the 14th or 15th Centuries, and such trees were still going strong in the 18th Century. However old these may be, I do not think that we can call them the oldest trees in the world; this honour must go to the giant Redwood trees of California, or to some of the smaller coniferous trees recently discovered in the western parts of U.S.A.

The Baobab is an erect tree, seldom going over 20 m. high; the bark should be fairly smooth, but is often badly scarred and unsightly. The leaves are rather large, similar to those of the *Silk Cotton Tree;* there is a long stout petiole, at the tip of which there come out 5 – 7 leaflets all from the same spot. The flowers are showy mostly on account of their size, 10 – 12 cm. long before opening, about 15 cm. across after opening; their colour is white with a touch of purplish in the anthers; the stamens are all gathered in a large bundle or column, which stands out very clearly when the petals, some time after the opening of the flower, turn and more or less curve on their backs. The fruit hangs down from a thickened stalk and is 20–30 cm. long, about half as thick or more, oval in shape, grayish or light brown in colour, more or less looking like a small gourd, hence one of the English names; the fruit consists of a rough outer woody coat, which encloses a mealy pulp in which numerous seeds are embedded. The pulp is sometimes eaten by humans, and is reputed as having a pleasantly acid taste, which makes the fruit refreshing in the hot season; however, I have tasted the fruit and found it rather insipid or tasteless; on the other hand, monkeys are fond of the fruit, which they eat with relish, so that the tree in parts of Africa is very properly called the *Monkey Bread Tree.*

Properties and Uses

As mentioned above, the tree is unsuitable for planting along streets or avenues, on account of the uncontrollable thickness of

its trunk; otherwise it is an interesting tree, which when growing in open country makes a brave show in flower. The soft nature of its wood makes the tree useless for carpentry work of almost any type; it is a good tree for the match industry, but in India it is not sufficiently abundant to make it worthwhile to collect it for the purpose. On the other hand, authors of books on the flora of Africa seem to wax enthusiastic on the many uses to which the tree can be put; it is said to be one of the most useful trees of Africa, every part yielding some product of economic importance. The fibres of the bark are very strong and of high quality for the manufacture of ropes, bags and even clothing; the same fibres have been used for the manufacture of especially strong paper, which has been found eminently suitable for paper money, etc. The pulp of the fruit has a taste like cream of tartar, and is made use of as a refrigerant in the treatment of various fevers; for a long time it has been used in the treatment of dysentery and other stomach diseases. The pulp of the fruit everywhere in Africa, and sometimes also in India, is used for the preparation of a pleasant and cooling sherbet. The bark was formerly exported to Europe, and is even now used in Africa, in the treatment of malaria in place of quinine. The dried leaves are credited with promoting perspiration and preventing kidney troubles. When the bark is incised, it yields a gum which has proved useful for cleansing foul sores, especially in camels and other domestic animals. The soft trunk of the tree is hollowed out and made into living houses; Livingstone describes one of those excavated trunks as sufficient to allow 30 men to lie down in it. The ash of the fruit and bark boiled in oil is used as soap by some tribes of Africa. In India the dry fruits are often used as floats for their nets by fishermen.

Popular imagination sees something eerie and sinister in this tree; it is probably the grotesque shape of the trunk, which, especially when the tree is bare of leaves, does look like one of those apparitions mentioned by Dante in his Inferno. Again this superstitious awe may have arisen from the fact that in some

parts of Africa the dead bodies of witch doctors and other distinguished men are suspended inside the hollowed trunks of these trees, where such bodies soon become perfectly dry and mummified without any further treatment.

2. KADAM

ADINA CORDIFOLIA Hook.

(*Family*: Rubiaceae)

THIS IS not a common tree in city streets, but it certainly deserves a place among our roadside trees. In Marathi it goes under the names of *Hedu*, or *Hedi* or *Haldwa;* it is also called, though incorrectly, *Kadam* or *Kadamb*. The name *Adina* has been coined from the Greek *adinos*, meaning crowded, with reference to the crowded condition of the flowers in dense balls; *cordifolia*, meaning 'with heart-shaped leaves', refers to the shape of the leaves.

DISTRIBUTION

This tree is indigenous in deciduous forests all over India; in Bombay forests it is considered, after teak, one of the five most valuable timber trees.

The largest Adina tree that I have seen is one in the Dangs Forest along the road from Waghai to Nasik, which, according to the tablet fixed at its base, in 1955 was 50 m. tall, with a girth at base of 5.5 m. This was said to be the largest tree in the whole of the Dangs district.

DESCRIPTION

A large deciduous tree, under good conditions going over 30 m., but normally about 14 – 20 m. tall. Leaves up to 25 cm. or more across, broadly oval or circular in shape, acute at the apex, heart-shaped at the base, slightly hairy especially when young, green or tinged with red or pink; nerves a strong one running from the base to the tip of the leaf and 5 – 6 pairs of lateral ones, which unite in a wavy line near the margin of the leaf. Leaves come out in pairs, one on either side of a branch, their stalks connected by a pair of stipules. These are two leaf-

Plate 2. KADAM (*Adina cordifolia* Hook.)
(*See page 20*)

Plate 5. PURPLE BAUHINIA (*Bauhinia purpurea* Linn.)
(*See page 32*)

like structures, up to 2.5 cm. long, enclosing and protecting the very young leaves and shoot apex; when the stipules fall away, they leave two clear lines, each encircling half of the branch. Leaf stalks are 5—10 cm. long. Flowers are insignificant individually, being very small; but they come out in balls of 2 – 3 cm. across; the tiny flowers are yellow or yellowish in colour, often tinged with pink. When the little flowers open out, the most prominent part are the styles, which form a sort of halo round the floral ball. Fruits are minute, forming an almost solid ball, which when ripe is black or nearly black.

Leaves are shed about February, and the tree remains leafless until about May – June; the stipules covering the buds are then very conspicuous. Flower balls are at their best from June to August. After the fruit proper has been shed at about the beginning of June of the following year, the fruit-heads appear black and are about 12 mm. across; the rains of the monsoon may bring them down and prepare the tree for the new flower balls.

Uses

Medicinally the bark of the tree is used as an antiseptic and in fevers; the juice of the tree is used to kill worms in sores; the medicinal principle seems to be mainly tannin. The timber is valuable, being moderately hard and even-grained. As an avenue tree, *Adina* is not very good, on account of its being leafless at the time when shade is most wanted in our streets, that is to say, during April and May. But in general this is a fine tree, attaining large proportions, and rather showy when in leaf; it is a good sight all through the winter months.

Cultivation

Seeds germinate quite readily on the ground when the monsoon arrives, but the resultant seedlings are very minute and delicate, and may be washed away by the rains; seedlings at first develop very slowly, under favourable conditions attaining a height of only 10 – 12 cm. in the first season. During these early

stages the tree is very sensitive to intense light and to drought; on the other hand, when the sapplings are well established, they require strong light. As for soil, *Adina* thrives best in well watered but well drained soil. Under artificial conditions, seedlings can be raised in beds or boxes of fine sifted soil with a considerable proportion of sand; the boxes should be protected from strong rain and sun. Transplanting requires care; it is best to lift the seedlings with a ball of earth round the roots. In the forest the tree produces a large crown on a straight clean bole; occasionally it produces a large number of irregular, fantastically shaped buttresses at the base. This is a valuable tree that may be planted with advantage on slopes where large clumps of trees are needed. A grove or even a large clump of these trees is a fine sight indeed, a delight to the eye of passers-by and a welcome refuge to the little birds of the air.

3. THE TREE OF HEAVEN

AILANTHUS EXCELSA Roxb.

(*Family*: Simaroubaceae)

THIS TREE was first described by William Roxburgh in 1795 for the Circars in the eastern parts of India; it is indigenous and common in parts of Gujarat, Bihar, Deccan and South India It is a tree of fast growth, and for this reason, it is being propagated in some of the drier parts of India. It is said to be indigenous also in Australia.

The name *Ailanthus* is a latinization of the vernacular name *Ailanto* of the Moluccas for *A. glandulosa* Desf. the Tree of Heaven. Our tree is known in Hindi as *Maharuk;* Guj.–*Ardusi;* Mal. – *Metti gongilyam;* Mar.–*Mahanimb;* Tel.–*Pedda-manu.*

DESCRIPTION

A fast growing deciduous tree up to 25 m. high, with whitish bark. Leaves pinnate, 25 – 75 cm. long; leaflets alternate or subopposite, 6 – 12 pairs, variable in shape, irregularly toothed at the margins and unequal-sided at the base. Flowers in much branched panicles, creamy or yellowish, about 8 mm. across. Fruit is a flat, papery pod or samara, 4 – 6 cm. long, 1 –1.5 cm. broad, lance-shaped, acute at both ends; seed one.

USES

The tree does well in poor soil and in very hot parts of India. The wood is light in colour and weight, and where abundant, is used for packing cases, fishing floats, etc. Graham mentioned in 1839 that the wood was much used for making sword handles. The bark of the tree is used as a tonic and febrifuge.

Plate 3. THE TREE OF HEAVEN *(Ailanthus excelsa* Roxb.*)*

Other Alianthus Species

A. triphysa Alst.(=*A. malabarica* DC.) is found in the Western Ghats, southwards to Ceylon, eastwards to Burma. In North Kanara I have seen trees over 30 m. tall. Incisions in the bark yield an aromatic resin which is used in *agor-batties*, and in medicinal practice in the treatment of dysentery.

A. glandulosa, the Tree of Heaven, is often planted in North India as a shade tree; it is indigenous of China, Moluccas, etc. Various parts of the tree are used medicinally.

4. DEVIL'S TREE

ALSTONIA SCHOLARIS R. Br.

(*Family*: Apocynaceae)

English—*Devil's Tree, Dita Bark Tree;* Hindi—*Chatian;* Bengali —*Chattim;* Marathi—*Satvin, Shaitan;* Tamil & Telugu—*Palaigh.*

THIS ELEGANT evergreen tree is found in most parts of peninsular India, particularly in the moister areas of the Western and Eastern Ghats up to a height of about 1000 m. It extends eastwards to Java and Australia.

NAMES

The generic name commemorates a distinguished botanist, Prof. C. Alston of Edinburgh, 1685 – 1760. The specific name, *scholaris,* refers to the fact that the timber of this tree has been used in the past to prepare slates for school children. The Marathi name, *Satvin,* refers to the leaves coming out seven at a time all round the branch at any node. The other name, *Shaitan,* refers to the maleficent magic properties with which the tree in the popular imagination is endowed.

DESCRIPTION

A tall elegant tree with greyish rough bark. Branches whorled, that is, several of them coming out of the main trunk at the same height, very much like the ribs of an umbrella. Leaves 4 – 7 in a whorl, leathery, in shape rather like those of the Mango tree, dark green above, covered with a whitish bloom beneath. Flowers sweetly scented, white or greenish-white in little clusters on slender long stalks at the ends of the final branches. Fruit is a long folliele 30–50 cm. long, 3–4 mm. thick, pendulous in pairs, produced in such large numbers as to change the general aspect of the tree. The tree is elegant because of the very

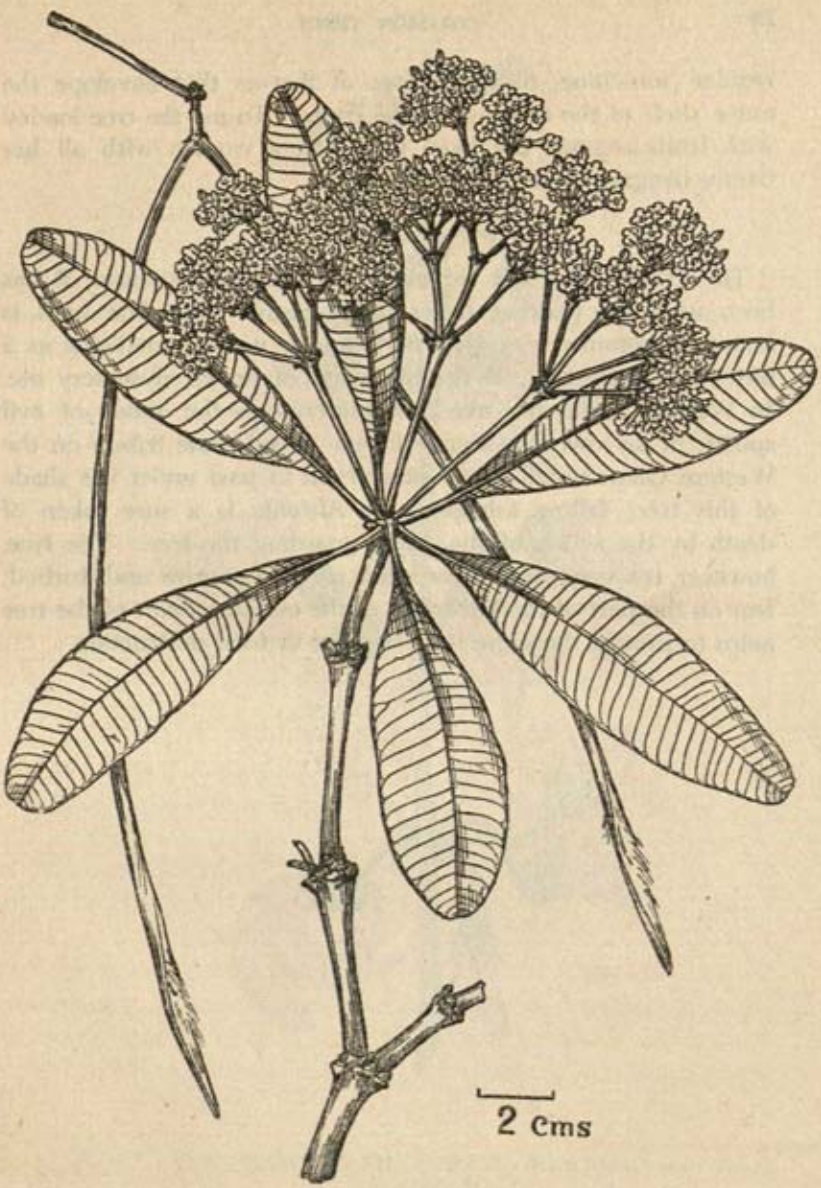

Plate 4. DEVIL'S TREE *(Alstonia scholaris* R. Br.*)*

regular branching, of the masses of flowers that envelope the outer 'shell' of the tree and of the fruits. To me the tree loaded with fruits suggest the head of a young woman with all her tresses hanging down loose.

Uses

The wood is too soft for use in permanent structures; it has been used for packing boxes, black-boards etc. The bark is known in commerce as *Dita Bark*, and is used in medicine as a bitter and astringent, in the treatment of fevers, dysentery etc. In Western India the tree is considered as the abode of evil spirits; in my own experience I have found some tribals on the Western Ghats unwilling to sit or even to pass under the shade of this tree; falling asleep under *Alstonia* is a sure token of death by the action of the devils guarding the tree. The tree, however, is a very elegant one when allowed to grow undisturbed; fear on the part of the hill tribes of the evil guardians of the tree helps to protect the same from damage or total destruction.

Plate 7. **THE FLAME OF THE FOREST** (*Butea monosperma* Taub.)
(*See page 41*)

Plate 10. GUL MOHUR (*Delonix regia* Raf.)
(*See page 54*)

5. THE JACK-FRUIT TREE

ARTOCARPUS HETEROPHYLLUS Lamk.

(*Family*: Moraceae)

THE JACK tree is a very common one in our streets and gardens; it has been known in parts of India from the beginning of historical times; the Greek historian Theophrastus writing about 300 B.C. says: "There is also another tree which is very large and has wonderfully sweet and large fruit; it is used for food by the sages of India..."

THE NAME OF THE TREE

In local Marathi it is known under the name of *Phannas;* in English it is the *Jack* or the *Jack-fruit Tree;* in our scientific literature it goes, wrongly, under the name of *Artocarpus integrifolia,* the correct name is *Artocarpus heterophyllus* Lamk. The generic name *Artocarpus* is made up of two Greek words meaning *Bread-fruit;* however, the tree that in English goes under the name of *Breadfruit tree* is *Artocarpus communis* Forst. or *A. incisus* Linn. f., which is the commoner species in New Guinea and various parts of Micronesia.

DESCRIPTION

A middle-sized to large evergreen tree; some of the leaves may fall during the winter season, but at no time is the tree completely leafless. Leaves 10—20 cm. long, elliptic in shape, acute at the apex, narrowed at the base, leathery and stiff in structure, smooth and shining above and deep green, rough and paler beneath; there is a stout middle nerve going from the base to the apex of the leaf, with seven to ten pairs of arching lateral nerves. Flowers at the ends of branches or on the trunk and branches away from the leaves; the two sexes are usually separate in different inflorescences. Male heads

2–10 cm. long, more or less cylindrical, roughly about the size and shape of the human thumb; individual flowers have a tubular perianth or corolla 1 – 2 mm. long, hairy with minute hairs; anthers minute, yellowish; the stalk of the male heads is stout, expanded into a ring just below the head; this ring may be but the remains of the bract or sheath that enclosed the head when young. Female head; flower very numerous, the styles free for about 2 mm; the real fruits of this tree are not the Jack-fruit, but the smaller pieces into which the Jack-fruit is split, roughly the edible portion of the fruit; the outer part or perianth is fleshy and edible with a sickly, sweet odour, very much like that of ripe bananas; the seeds are over 2.5 cm. long, 1.6 cm. thick; the whole of the Jack-fruit grows to 30–90 cm. long, 20–40 cm. thick.

Uses

This is an elegant tree, often planted for the sake of the shade provided by its leaves; its general look, however, is somewhat sombre, due to the deep green colour of the leaves. The tree produces fruit quite readily in peninsular India; in due season it is an important item in the fruit markets of, *e.g.*, Bombay. The fruit is edible and rather tasty, though this is one of those fruits, the taste of which needs some trial; when the fruit is over-ripe, it may have a rather strong and unpleasant odour. The fruit is generally eaten raw; but it, as well as the seeds, may be eaten cooked. The timber of the tree is bright yellow when freshly cut, turning darker with age and becoming almost as dark as mahogany; the timber is used for high class furniture.

Original Home

This tree is now very widely cultivated in many parts of India; it has been suggested that it is indigenous in the Western Ghats of India in rain forests at altitudes of 600 – 1000 m. It is mentioned as wild also in evergreen forests in Assam and Burma.

Cultivation

The best results are obtained in a moist tropical climate and a deep rich soil, but the tree can grow on almost any soil. Cultivation is effected through seeds; it is better to plant these on the spot where the tree is to grow, as the long and delicate tap root of the seeding is easily damaged. Seeds may be grown in baskets, provided care is taken not to damage the roots. The seedling thrives best in full open light, when the soil is kept moist.

On the subject of the Jack tree, Nairne, the author of a very popular book on the flowering plants of Western India, writes: "The immense fruit, the largest eatable fruit in the world (Tennent), sometimes attaining (it is said) the weight of 60 lbs... looks like a huge parasite on the trunk of the tree; the smell generally deters Europeans from tasting it, but having once ventured, I can state that the flavour is not disagreeable... It is said that the situation of the fruit varies with the age of the tree, being first borne on the branches, then on the trunk, and in very old trees on the roots. Its tenacious white juice makes the best bird-lime..."

6. SOME OF THE BAUHINIAS OF INDIA

(*Family:* Caesalpiniaceae)

THERE ARE several species of this genus scattered all over India, some wild in our forests, others cultivated in gardens. The present chapter will deal with several of the commoner species.

The genus *Bauhinia* was named by Linne in honour of two French brothers, Jean and Gaspard Bauhin, two distinguished botanists and authors of the 16th and 17th Centuries, in the words of Linne "the two-lobed leaves or two as it were growing from the same base recalling the noble pair of brothers"; the Bauhin brothers, however, were not twins, much less were they Siamese twins, as one might think from examination of the leaves of the plant genus dedicated to their memory! Jean Bauhin, 1541 – 1613; Gaspard Bauhin, 1550 – 1624.

PURPLE BAUHINIA

BAUHINIA PURPUREA Linn.

English – *Purple Bauhinia;* Hindi – *Khairwal, Kanar;* Marathi – *Atmatti;* Telugu – *Kanchan.*

This medium-sized tree is indigenous in the sal forests in the lower slopes of the Himalayas, going up to 1000 m., extending eastwards to Assam and southwards to peninsular India. Leaves are about 10 – 14 cm. long, usually longer than broad, and split at the tip into two lobes down to 1/3 or 1/2 of their length; the lobes are more or less pointed or rounded; the base of the leaf is rounded, and 9–11 nerved, with strong arching nerves. Flowers are showy, rose or purple in colour, gathered towards the ends of the branches. The calyx consists of a sheath-like structure that splits into two halves. The

corolla has five petals, each about 4–5 cm. long; the petals are rose or purple, usually one of them being more deeply coloured than the rest. Stamens usually five, but only three bear anthers, the other two being sterile. Pods 15–25 cm. long, 12–18 mm. broad, flat, greenish or purplish till maturity, and remaining on the parent plant until the seeds are ripe, and then splitting suddenly and scattering the seeds. This tree is native at the foot-hills of the Himalayas, and is cultivated in most parts of India.

Flowering and Fruiting

Flowers of this tree may be seen particularly from September to December; they are very fragrant; in the native haunts of the tree flowers are often visited by bees in search of pollen or nectar. Fruits form readily on the tree, even while some of the flowers are on, and ripen between January and March. The seeds may then be scattered, but they do not germinate until the rains. Germination is of a high order, often 100%; but many of the seeds fail to produce seedlings due to the fact that many insects seem to be particularly attracted to the young roots or shoots of this tree.

Cultivation

R. S. Troup in his *Silviculture of Indian Trees* gives the following hints. This tree demands plenty of light; it should, therefore, be planted in open places away from buildings or from large shady trees. It is best to plant the seeds in good soil, about 20 – 25 cm. apart; watering of the soil regularly has a marked effect on the growth of the seedlings. When the time for transplanting the seedlings comes, great care must be taken to see that the delicate rootlets are not damaged; the seedlings are rather sensitive to transplanting.

Economic Value

Most parts of the tree are of economic use in this country.

The leaves are used as cattle fodder; the bark of the trunk is used in the dyeing and tanning industry; the wood is moderately hard and is used for making agricultural implements; the flowers are used for decorative purposes, or are eaten by men either cooked as a vegetable or after pickling. However, one word of caution on the use of this tree: the bark of the underground root is poisonous even in a small quantity (Blatter & Millard). In Bombay and in many places in India, this tree is cultivated mainly for its decorative value in gardens and avenues.

JHINJERI

BAUHINIA RACEMOSA Linn.

Hindi – *Jhinjeri;* Marathi – *Apta;* Tamil – *Vettatthi.*

In western parts of India, this tree is known under the name of *Apta;* it is one of the best known of our wild trees, at least among smokers, for the leaves of this tree are used in Western India as wrappers for the popular *bidis* or country cigarettes. Flowers are insignificant either on account of their colour or of their size, in general the tree has always a wild look, its trunk being short and crooked. This species of *Bauhinia,* however, is of value because it grows in poor soil, in open rocky places, and is, therefore, of value for protecting the soil in such open places.

PUBESCENT BAUHINIA

BAUHINIA TOMENTOSA Linn.

This is a small tree, in general appearance very much like the preceeding plant. I have seen it growing in abundance on the lower slopes of the Girnar in Saurashtra, but am unable to say

if the tree was indigenous at the spot or had been planted by the Forest Department. In Gujarati the tree goes under the name of *Pilo Asondaro;* as it is so rare in the Marathi speaking parts of the country, there does not seem to be a Marathi name for the tree. The flowers of this *Bauhinia* are up to 7 cm. across, white or creamy white in colour or pale yellow. Lately I have seen several such trees cultivated in gardens. They were a fine sight with the numerous large flowers scattered on the periphery of the tree.

VARIEGATED BAUHINIA

BAUHINIA VARIEGATA Linn.

This tree is often cultivated in gardens all over India. It is so similar to *B. purpurea* that even a trained botanist finds it difficult to tell one tree from the other, if indeed they are different at all. *B. variegata* is known in Hindi under the name of *kachnar;* in Bombay as *kanchan;* in Bengal as *rakta kamhar;* in English, it is known as *Variegated Bauhinia;* the standard U.S.A. name is *Buddhist Bauhinia.* Its flowers are white or purple, both colours often being found in the same tree. The tree is indigenous in the drier hilly parts of India. It is cultivated in open gardens or along some of the sea coasts practically all over peninsular India.

CLIMBING BAUHINIA

BAUHINIA VAHLII Wt. & Arn.

This is an immense climber going over the tops of even the highest trees in the forest, and doing much harm on account

of the shading of the growing tops of useful forest trees. Flowers come out in large bunches towards the end of the branches; the corolla is yellowish or white, about 7 cm. across; the plant is very showy on account of its massed flowers and its hooked rusty tendrils. Leaves are collected and used as dinner plates much as we use banana leaves. Pods are strong and woody, easily reaching 25 cm. long and 7—10 cm. wide; the seeds are eaten by the hill tribes of the areas where the plant is common. This climber is found occasionally in Bombay forests especially in the denser forests of the Western Ghats. It is common from the foot-hills of the Himalayas southwards along the Eastern Ghats. It is a very elegant plant, but it suffers much persecution from foresters, who try to protect their trees from this plant, and from hill tribes who collect the seeds as an article of food.

PORE-LEAVED BAUHINIA

BAUHINIA FOVEOLATA Dalz.

This is not a common tree, but deserves mention on account of its name. It is fairly common along the Western Ghats; it reaches 25 m. in height, and may even go beyond 30 m. The flowers are not striking either by their colour or their size; but the leaves are about the largest for the genus in India; often they reach over 30 cm. across. The scientific name, *foveolata*, is derived from the fact that the underside of the leaves is covered with minute pores (foveoli), each of which has a sort of stopper or plug retained in position by a slender thread coming from the middle of the pore; in a minute way such pores are like our kitchen sinks with the corresponding plugs and chains, but with this difference that the 'chain' in this tree comes from inside the 'sink'.

7. SILK COTTON TREE

BOMBAX CEIBA Linn.

(*Family*: Bombacaceae)

Names

In the botanical literature of India, there is scarcely a tree which has tried the patience of botanists and foresters more often than the present tree. It has been listed in our floras under the names of *Bombax malabaricum, Salmalia malabarica, Bombax ceiba,* etc. In many parts of India, the tree goes under the name of *Simul;* in English it is called the *Cotton Tree* or the *Silk-Cotton Tree;* occasionally it is also spoken of as *The Flame of the Forest,* though the latter name usually is reserved for the *Palas* tree. The generic name *Bombax* refers to the cotton obtained from the fruits; the name *Salmalia* has a world of tradition and poetry; it has been derived from the Sanskrit *Salmali* or *Shalmali,* under which name the tree was known in ancient India, as the tree under which Pitamaha rested after the creation of the world.

Description

The *Silk-Cotton* tree is a tall deciduous tree with wide spreading branches. It often reaches 25 m. in height. The wood is rather soft; the bark light in colour, but at least in the young stages is covered with sharp conical prickles, which effectively keep the tree safe from animals and men. The leaves are large, bright green, rather stiff in texture, divided into 5 – 7 leaflets, which are themselves leaf-like and spread like a fan; these leaflets are lance-shaped, acute or tapering at both ends with numerous clear nerves. The leaves remain on the tree for the greater part of the year and this makes Simul one of the best shade trees of the country; just before flowering time all the

Plate 6. SILK COTTON TREE *(Bombax ceiba* Linn.*)*

leaves fall off, and then there remains but a gaunt, skeleton-like tree, but not for long. The Silk-Cotton Tree sheds its leaves towards the end of January, and comes into flower from February onwards.

The flowers of the common Silk-Cotton Tree are bright crimson or red. Occasionally they are yellow or white; the yellow-flowered tree is credited with miraculous powers, human and divine, in popular belief, and for this reason, the tree is often maltreated by devotees trying to obtain some of the spiritual benefits from the use of bark or wood of the tree. Flowers come out when the tree is leafless; they come in very large numbers so that the whole tree is a mass of brilliant colour. There are few trees in the whole world that can compare with the glorious display put up by our Simul trees. To add to the beauty and attractiveness of the tree, many bright birds frequent it in search of nectar from the flowers; the lively chatter of Mynahs, Rosypastors, accompanied by the basso of the crows and the twittering of sparrows and other small birds make this a grand symphony of nature. The man who does not feel excited in the presence of such beauty, surely must have a soul of iron.

The calyx is thick, cup-shaped, silky on the inside, smooth outside. The petals are thick, 12 and more cm. long, 2 – 3 cm. broad; the stamens are grouped in the middle of the flower in several bundles, in all 60 stamens in the common Simul, between 60 and 600 in other species of India; the stamens are more or less of the same colour as the petals or slightly paler. The fruit is roughly egg-shaped in structure, 10–15 cm. long, 3–5 cm. thick, and consists of 5 stout woody valves, which at maturity open out and fall away from the rest of the fruit. This causes masses of small brown or black seeds covered with white cotton, to fall out and scatter all over the countryside; if you have a Simul tree near your home, you will find it very difficult to keep your room tidy from the cotton which is blown about by the lightest breeze.

Uses

Simul is a very valuable tree; every part is of use. The timber is soft, and is used in the manufacture of match sticks in Bombay and elsewhere; in an average year Bombay consumes nearly 100,000 tons of the timber for matches. In other parts of the country this light soft timber is used for making packing boxes for bulky and heavy articles; fishermen use it for floats for their nets. On the other hand, this timber is highly attractive to white ants, and for this reason becomes useless for any permanent structure. The cotton fibre from the seeds is much too short for spinning; it is, however, used for stuffing mattresses and pillows. The gum given out by the tree from wounds and cuts, known as *Mocharas*, has some repute in medicine among Ayurvedic practitioners. The calyx of the young flowers is cooked and eaten as a vegetable.

The Simul as an Avenue Tree

The beauty and brightness of the flowers and the shadiness of the leaves make this one of the finest trees in India, either in the jungle or along our roads and streets in cities. The tree needs protection against strong winds, since its soft wood gives way in stormy weather. In somewhat protected places, this is one of the best trees, but it needs plenty of room to spread its leaves and branches.

Cultivation

Cultivation is of the simplest; either through cuttings or through seeds it is possible to plant this tree in almost any type of soil. The leaves are readily eaten by cattle and goats, at least when young, but the strong and very sharp prickles give the tree sufficient protection once it has passed out of the seedling stage.

8. THE FLAME OF THE FOREST

BUTEA MONOSPERMA Taub.

(*Family*: Papilionaceae)

In our popular literature there are several trees that go under the above name; in particular the Silk Cotton Tree (*Bombax* or *Salmalia*), the Indian Coral Tree (*Erythrina*) and the Palas Tree (*Butea monosperma*) are now and then referred to as the Flame of the Forest. The only tree to which the name should be applied is *Butea monosperma* Taub. (or *Butea frondosa* Koen. ex Roxb. as it is given in most of our floras), known as Palas.

Description

A small to medium-sized deciduous tree, with a crooked trunk and branches; in most parts of Bombay it seldom goes beyond 6 m. in height. Bark is greyish or light brown in the older parts of the tree. The leaves are trifoliate, that is to say, they consist of a stalk 8–12 cm. long and three leaflets, of which two 8–12 cm. across, are opposite to each other, the third and larger, 12–20 cm. across, being some distance away from the others; all the leaflets are leathery and stiff, the terminal one with equal sides at the base, the laterals very strongly unequal-sided at the base, all obtuse or rounded at the apex; young leaflets are finely silky, older ones more or less smooth but hairless. The leaves fall off in winter; the flowers appear on the tree at the beginning of the hot season, February to March, when the tree is completely leafless. The flowers are large, at times as large as an adult human thumb, densely crowded on the leafless branches, several flowers at a time on a swollen node on young branches; the latter as well as the flower stalks are velvety dark olive-green in colour, sometimes very dark, almost black. The calyx of the flowers forms a sort of irregular cup at the base outside, and is of the same colour as the young twigs on the outer, but clothed with fine silky

hair on the inner side; the rim of the calyx cup should normally have five teeth, but usually the two upper ones are fused, and the result is a cup with four teeth. The corolla is 3–5 cm. long, of a rich orange– or salmon-red colour, silky hairy outside with silvery hair. The fruit is a flat pod or legume, 12–18 cm. long, about 4–5 cm. broad, narrowing somewhat towards the tip, in which a large solitary seed is enclosed. When young, the pods are velvety with dense hair, at length they become more or less hairy. Dry pods are not elegant; they hang down on the tree, and, I do not know for what reason, to me they always appear like a large number of *chappals* hung up in the air to dry!

Distribution

The Flame of the Forest, *Butea monosperma*, is found all over India and Burma up to 1000 m.; it is common in dry deciduous forests in Central India. It is also common in some of the sandy areas in Gujerat and Saurashtra. Nearer Bombay, the tree is common on the hills from Kalyan to Igatpuri or to Khandala along the main road or the railway lines. At the end of February or beginning of March, one can appreciate the correctness of the name, *Flame of the Forest;* some parts of the forest are a vivid mass of colour, which is very striking in the general leafless condition of most trees in such areas.

Uses

The Palas tree is seldom cultivated in gardens or along the streets of towns; the tree looks too wild and rugged except when it is in full bloom. Unfortunately the tree suffers from the constant lopping or cutting of leaves and branches; our farmers in the Konkan and elsewhere collect such branches and spread them on their rice fields; when the branches are thoroughly dry, they are set on fire, either by themselves or mixed with cowdung. If left to itself, the Palas tree can succeed even on poor soil; it does well even in some of the more sandy and arid areas in India.

This simply means that the tree can profitably be used for the regeneration of poor soils. In many parts of India this tree is used for the cultivation of the lac insect; it is said that the quantity of lac produced exceeds that on any other tree, even though the quality is not of the best. When the bark of the tree is cut or scratched, it gives out a red or reddish juice, which on exposure to air hardens into a glassy ruby-red gum; commercially this gum is known as 'Bengal Kino'; it is a powerful astringent and is medicinally used in the treatment of many forms of chronic diarrhoea. The seeds have long been used in India against roundworms and tapeworms, though they seem to be useless against hookworms. The leaves of the Palas are made into platters, cups, etc.; in some parts of the country they are also used as bidi wrappers.

If you wish to see an impressive and colourful sight, you might just go along the main road to Tansa Lake, or riding in the Western Railway from Bombay to Delhi keep your eyes open in the neighbourhood of Kotah. You will then easily understand why this tree has been called by the very appropriate and expressive name of *Flame of the Forest*.

The name, *Butea* was coined by Koenig or Roxburgh in honour of John Stuart, 3rd Earl of Bute, who "for several years lived in retirement in Bute, engaged in agricultural and botanical pursuits." (*Encycl. Brit.* 4: 459, 1959). The specific name *frondosa* means 'leafy' or 'full of leaves'; the other name, *monosperma*, means 'one-seeded' and refers to the fruit with a single seed near its apex.

9. ALEXANDRIAN LAUREL

CALOPHYLLUM INOPHYLLUM Linn.

(*Family*: Guttiferae)

English—*Alexandrian Laurel;* Hindi—*Sultana Champa;* Marathi—*Undi;* Bengali—*Sultana Champa;* Tamil—*Pinnai, Punnai.*

THIS VERY elegant evergreen tree seems to be indigenous in the coastal districts of Eastern and Western India, going eastwards through Burma and Malaya to Australia, southwards to Ceylon, westwards to the islands of E. Africa; the tree is essentially a littoral species and grows on dry sandy beaches, where few other trees will succeed. It is abundant from Bombay to Ratnagiri and in the Andaman Islands. Under cultivation the tree is found along streets in our towns, especially along the coasts, and as a road-side tree. It is a very elegant tree with dark green shining leaves, and white, sweetly scented flowers. The generic name, *Calophyllum*, meaning 'Beautiful Leaves' is a very apt one; the specific name, *'Inophyllum,'* meaning 'with strongly nerved leaves' describes an important character of the tree.

DESCRIPTION

An elegant tree with smooth dark bark. Leaves in opposite pairs, broadly elliptic, with margins turned somewhat back, and with very close parallel lateral nerves running nearly at right angles to the mid-nerve; base of leaf acute; petioles stout and flattened. Flowers pure white, sweet-scented, about 2.5 cms. diam. in lax axillary bunches or racemes. Sepals 4, nearly orbicular. Petals 4 spreading. Stamens many, the filaments united into a few bundles. Stigma mushroom-shaped, on a long twisted style. Fruit at first green, finally yellow, with a smooth skin, the fruit 2–3 cm. across.

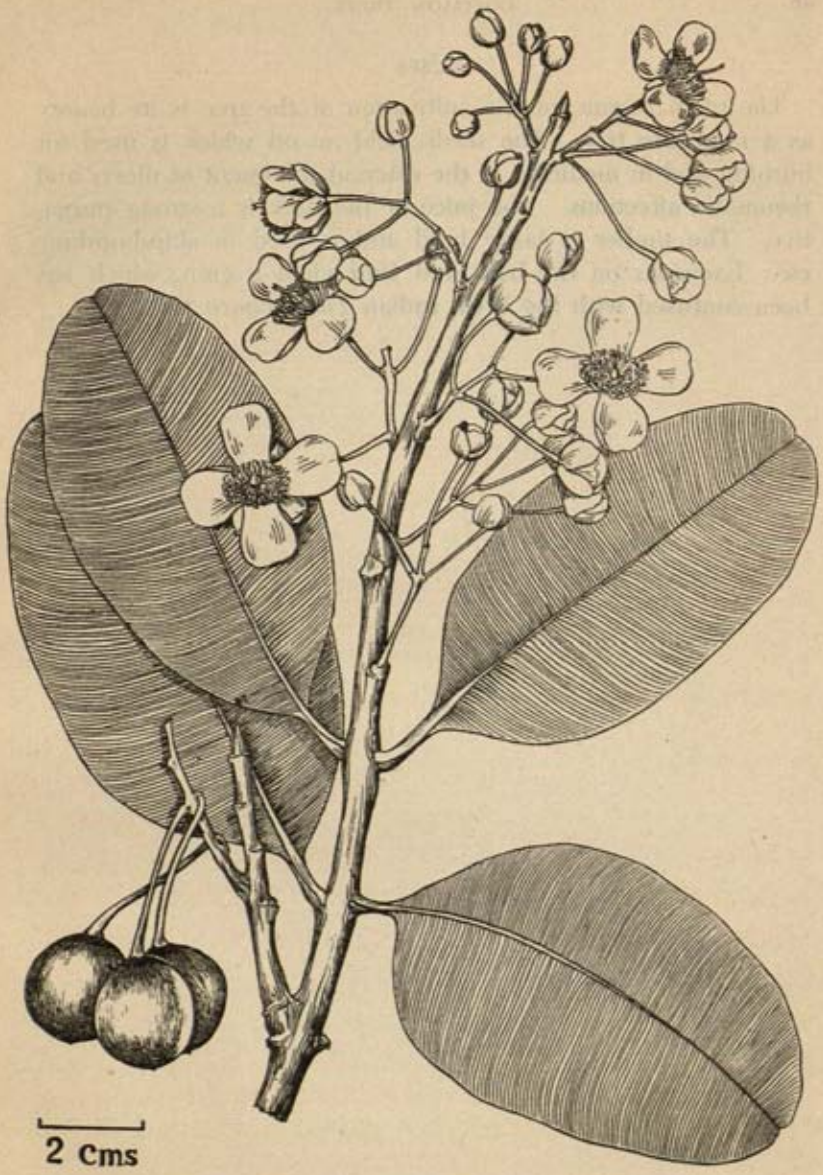

Plate 8. ALEXANDRIAN LAUREL (*Calophyllum inophyllum* Linn.)

Uses

The main reason for the cultivation of the tree is its beauty as a road-side tree. The seeds yield an oil which is used for burning and in medicine in the external treatment of ulcers and rheumatic affections. The juice of the bark is a strong purgative. The timber is fairly hard and is used in ship-building, etc. Excisions on the bark and fruit yield a gum, which has been confused with the West Indian *Tacamahaca Gum*.

10. AMALTAS TREE

CASSIA FISTULA Linn.

(*Family*: Caesalpiniaceae)

English—*Indian Laburnum, Amaltas Tree;* Hindi & Bengali—*Amaltas;* Marathi—*Bahava;* Tamil—*Konnei;* Telugu—*Relu.*

THIS IS one of the most beautiful of our indigenous trees; it adds colour to our hills during the drier and hotter parts of summer. The name, *Indian Laburnum,* has been given to it on account of the general similarity in the colour and profusion of flowers with the European Laburnum. The specific name, *fistula,* meaning 'a pipe' or 'a reed-pipe' or 'shepherd's pipe' has been given on account of the shape and size of the fruit. *Cassia* is a classical name, apparently of *Cinnamomum iners.*

DESCRIPTION

This tree is generally small to middle-sized, 6–15 m. high; the trunk is short; the leaves are of a deep green colour, compound in structure, each consisting of 4–8 pairs of leaflets; the leaflets are 5–12 cm. long, and about two-thirds as broad. All leaves are shed during the months of March to May, and it is during this leafless period that the flowers come out in great profusion; they come out in long drooping racemes, the flowers near the base of the raceme opening out first; individual flowers are bright yellow in colour and 3.5–5 cm. across. Stamens are ten in number, three long ones, four rather short, and three very short, only the longer ones being usually fertile.

The fruit is one of the most striking sights on our hills. It is about 50–60 cm. long, 2–2.5 cm. thick, black or nearly black in colour when ripe, with many faint transverse lines showing the inner partitions through the skin. A leafless tree just before flowering is indeed a sight: there may be up to one hundred fruits hanging down from the branches of the tree. Internally

Plate 9. AMALTAS TREE *(Cassia fistula* Linn.)

the fruit is divided into many regular cells, each cell consisting of parallel partition walls and one flat seed; lining the partition walls, and at times the side walls also, there is a blackish, sweet pulp, which is often used as a mild purgative.

Distribution

The whole tree, in leaf or in flower, is a highly decorative one; this is why it is a very popular tree all over the country for road-sides and gardens. In Bombay Laburnum Road was so named because of the double row of trees planted along the street; in Delhi, Calcutta and other towns in India, Amaltas brightens the lives of our people in the hot season. In its wild state Amaltas is common over most parts of peninsular India, especially in hilly deciduous forests.

Cultivation

Propagation can be readily effected through seeds; some gardeners, however, may experience difficulty in germinating them, some seeds may take over one year to germinate. If the seeds are planted in flower-pots and watered abundantly, they may germinate more easily; seedlings can be transplanted at the beginning of the monsoon.

Uses

The tree is very decorative, and is generally planted for the sake of its showy flowers. Other uses, however, render the tree important in the economy of the country. The timber is hard and durable; the flowers are at times eaten as vegetables by the hill tribes of India; the pulp of the fruit is employed as a mild purgative; the root is used as a tonic and febrifuge.

On account of its real or supposed medicinal properties Amaltas suffers persecution in many parts of India; when pieces of bark from the trunk are removed, the tree responds by producing some rather unsightly blisters which make the tree a sorry sight. This is often the case with trees cultivated along the streets in our towns.

11. CASUARINA

CASUARINA EQUISETIFOLIA Forst.

(*Family*: Casuarinaceae)

English—*Beefwood Tree, Casuarina;* Marathi—*Sura;* Tamil—*Cavukku;* Telugu—*Chowka, Saruku;* Bengali—*Belati-jhau.*

CASUARINA IS indigenous along the coastal areas from Chittagong, eastwards through the islands of the Indian Ocean, to the islands of the Pacific and Queensland in Australia. It is under cultivation along many coastal districts in India. The tree was first introduced into the Calcutta Botanic Garden from Chittagong by Francis Hamilton in 1798. Extensive plantations of this tree may be seen from Madras up to Puri in the east coast, and in North Kanara, Ratnagiri and northwards beyond Bombay along the west coast. *Equisetifolia* means 'with leaves like *Equisetum*'. The Australian name, *beefwood*, refers to the colour of raw meat shown by the wood of the living tree when the bark has been removed. The name *Casuarina* is "said to be derived from the Latin 'Casuarius', the Cassowary, from the resemblance of the branches to feathers." (Benthall, *Tr. Calc. 240*)

DESCRIPTION

A large evergreen tree of rapid growth, reaching 30 m. or more in height. The woody branches of the tree end up in green, many-sided branchlets, carrying a number of minute scales at the nodes; these scales represent the leaves. In general Casuarina looks like a pine tree, though the leaves or needles of the latter are usually shorter than the green branchlets of Casuarina. Flowers inconspicuous, unisexual, the males in terminal cylindric spikes, each flower consisting of one stamen and two scales; the female flowers are in small spherical cones, which

become woody when ripe; seeds winged, very minute, very numerous.

Uses

The wood is hard, but in India is not used for carpentry; it makes good mine props, and one of the best fuel woods. The tree has been very successfully employed in the reclamation of land near the sea, where at the same time it makes an excellent wind-break; after a time other and more useful trees can be planted in the area. Casuarina is a good garden tree, on which Benthall in *Trees of Calcutta* writes: "the soft sighing of the air through its innumerable slender twigs is a pleasant sound, reminiscent of the noise of the sea on a distant shore, and its light open foliage is a pleasant change from the sombre greens of most tropical trees." For some unknown reason birds do not seem to like Casuarina; if, therefore, you wish to have birds in your garden or plantation, grow other trees mixed with Casuarina.

Cultivation

Sow fresh seeds in a nursery bed, which must be free from water-logging; the tree does not do well in clayey soil. Seedlings may be transplanted when about one year old; they must be planted under the open sky, as they are very sensitive to shading. Casuarina trees may be cut down for fuel after ten years, and should be cut down before they are fifty years old. Old trees often suffer from a fungal infection that blocks the water vessels and causes serious malformations on the trunk, and eventually kills the tree. Although Casuarina is a littoral species, it has been successfully planted in most parts of peninsular India as an avenue tree. But to see this tree in all its glory you must go to the sea coasts of India.

12. SHISHAM

DALBERGIA LATIFOLIA Roxb

(*Family*: Papilionaceae)

English–*Bombay Rosewood, Bombay Blackwood;* Hindi–*Shisham;* Bengali–*Sitral;* Kannada–*Biti;* Marathi–*Shisham;* Tamil–*Iti, Eriwadi.*

Names

The generic name *Dalbergia* commemorates N. Dalberg, a Swedish botanist of the end of the 18th and early 19th centuries. *Latifolia* means 'with broad leaves'.

Distribution

The tree is indigenous and endemic from the Himalayan foothills, to Central and South India, and is more common in hilly parts, going up to 1500 m. elevation. In open deciduous forests in Central and West India the tree is small and crooked, scarcely reaching 10 m. in height; in the moister areas in South India it is a large tree growing to large sizes, trees 25 m. high being common, trees over 35 m. high have also been recorded.

Description

A small to large tree with spreading branches forming a shady head; the tree is said to be deciduous, but at no time is entirely without some leaves; leaf shedding takes place at the end of winter. Leaves consist of a central stalk and 5–7 leaflets placed alternately on either side of the stalk; leaflets more or less orbicular, firm, green above, paler beneath. Flowers white in colour, very similar in appearance to those of *Pongamia*, in lax clusters from leaf axils. Fruit a strap-shaped, flat pod with 1–3 seeds. The tree flowers in the hot season, the fruits remain on the tree for some months, usually until the monsoon.

Uses

This tree yields one of the most valuable timbers of India, known in the trade as *Indian* or *Bombay Rosewood* or *Blackwood*. In a recent note published in Indian Forester, D. G. Wesley reports that a log of this tree of 63.7 cubic feet "was sold for Rs. 23,059.40, giving a rate per cft. of Rs. 362. To my mind this is a record for any kind of timber sold in India to date." (*Indian For.* 89: 462, 1963). G. Watt says of the timber of this tree: "The timber is one of the most valuable in India, is strong, very hard, close-grained, and of a purple black. It takes a beautiful polish, is reckoned the best furniture wood." (G. Watt, *Dict. Econ. Prod.* 3 : 9, 1890).

Cultivation

Plant fresh seeds in a well-drained nursery bed, only fresh seeds give a high percentage of germination. Transplant the seedlings at the beginning of the monsoon and at first give them partial shading; later on the seedlings benefit from full open light. The tree does best in well-drained moist soil, but can also stand poor dry soils. The tree is occasionally planted along roadsides, where it does fairly well. However, when most of the leaves are gone, this is not elegant.

13. GUL MOHUR

DELONIX REGIA Raf.

(*Family:* Caesalpiniaceae)

DURING THE hotter part of the year immediately preceding the monsoon, many of the streets of our cities seem to be on fire with masses of flowers of the Gul Mohur; this is one of the most showy and common road-side and avenue trees all over peninsular India.

NAMES

The scientific name of the tree is *Delonix regia* Raf.; in some older books it goes under the name of *Poinciana regia* Boj. *Delonix* means "with a clear claw or nail," with reference to the shape of the petals, particularly of the larger or fifth petal. In Hindi the tree is known as the *Gul Mohur; Gul* means rose or flower; *Mor* is the common name for the peacock; it has been suggested that the name is a corruption of *Gulmor*, the peacock rose or peacock flower. In English the tree is variously known as *Flamboyant, Royal Gold Mohur, Royal Peacock Flower, Fire Tree;* among Bombay Christians it is often referred to as the *Pentecost Tree* or the *Holy Ghost Tree,* with reference to the fact that its peak flowering occurs about the feast of Pentecost, 50 days after Easter.

ORIGIN

The tree seems to be native of Madagascar; at the beginning of the XIXth Century it was taken to Mauritius, and this is why at times it is said to be native of Mauritius. It is not clear when the tree was introduced into India; Voigt in 1845 mentions it in his catalogue of the Botanic Garden of Calcutta with the simple indication that it flowers in the rainy season; there are records that about 1850 the tree was growing in Bombay.

It has now become one of the commonest trees in many of the urban parts of India.

Cultivation

This is a middle-sized tree, 5-10 m. tall, its size depending on its age or on the type of soil on which it grows. The *Gul Mohur* is well adapted to a variety of soil and climatic conditions; it can thrive near the sea, but it also does very well in the drier parts of the country. The roots are shallow and spreading, and on this account the tree may not be suitable for gardens, for little else will grow in the neighbourhood of the tree; on the other hand it can do well on rocky soil. One difficulty, however, is that on account of its shallow roots, the tree may be blown down during the stormy weather of the monsoon. The *Gul Mohur* is a fast grower, and produces a spreading, umbrella-like head, and this makes the tree very suitable for avenues where both flowers and shade are desired.

Description

The leaves are feathery, and very elegant, the colour light green of a very pleasant hue. Each leaf may reach up to 50 cm. in length; the leaves are compound, that is to say, consisting of 10–20 pairs of pinnae or smaller leaves, on a fine midrib; each pinna bears 20–30 pairs of small, light-green leaflets. All the leaves fall off just before the flowering season, about the middle of February or the beginning of March or sometimes a little later; when the tree is completely bare of leaves, flowers come out in large numbers, and then the whole tree is aptly called *The Fire Tree*. Flowers are arranged in very large racemes at the ends of the branches. Each flower may reach 10 or 12 cm. across, and consists of 4 bright scarlet petals, with a fifth, the standard, slightly larger in size and variegated red and yellow in colour. Petals are spoon-shaped, with beautifully crinkled margins; the base is narrow and long, and suggests some sort of a claw, hence the scientific name of

the tree. Before the opening of the flowers, the calyx encloses the petals, and is pure light green; after the opening of the flowers, the inside of the calyx is bright scarlet. There are ten stamens, of varying length, consisting of a slender bright red filament and a yellow or yellowish anther. The fruit is a large pod, which at first is green and rather soft; in time the fruit turns deep brown and very hard, up to 50 cm. long, 5–8 cm. broad, and about 1–1.5 cm. thick. The seeds are oblong and mottled. The wood is white and light, and takes a fine polish.

14. DUABANGA

DUABANGA GRANDIFLORA Walp.

(*Family:* Sonneratiaceae)

Assamese—*Khukan, Hokol;* Bengali—*Bondraphulla;* Nepali—*Lompatia.*

Names and Distribution

The generic name, *Duabanga,* was coined by Francis Hamilton from the vernacular in Tripura, *Duyabangga; grandiflora,* meaning 'large-flowered', refers to the size of the flowers of this tree; in the older literature of India the tree goes under the name of *D. sonneratioides,* the name meaning 'similar to *Sonneratia*'.

A tall deciduous tree of quick growth indigenous in the Eastern Himalayas, southwards through Assam to Burma and Andaman Islands to Malaysia; the tree ascends to about 1,000 m. above sea level. It is generally found along the banks of rivers in some of the sub-Himalayan valleys. In its native haunts, it is a very impressive tree reaching 30 m. or more in height. On account of the quick growth the tree has been introduced in several parts of India in the last few years.

Description

The trunk is straight, light brown in colour with branches coming out several at the same height all round the trunk and spreading out horizontally in all directions. Young branches are smooth hairless and four-sided. Leaves opposite, red when young, horizontal in two rows one on either side of the branch, oblong in shape, shining above, dull beneath, over 25 cm. long, and 10 cm. broad. Flowers come out in axillary and terminal panicles, each flower 5–7 cm. across, white in colour, ill-smelling. Calyx very thick, persistent, bell-shaped, divided above

into 6 segments; petals 6, soon falling off; stamens many; fruit is a more or less rounded leathery capsule, about the size of a small orange. Seeds many.

Cultivation

Reproduction is easy enough through seeds, or better results may be obtained by germinating the seeds first, and then planting the seedlings at the beginning of the rainy season. The rate of growth of the tree seems to be very striking; in an experimental part of the forest in the southern parts of the former Bombay State some years ago I was shown trees over 8 m. tall which had been planted from seed just five years previously. The wood is fairly soft and has been used in the eastern parts of India for preparing tea chests. It has also been recommended for match sticks.

This tree may often be seen along the banks of streams in Assam and Sikkim; along the Teesta river below Kalimpong the tree is common and must be counted among the giants of the forest. It is an impressive sight, with all its branches arranged rather symmetrically in horizontal tiers, with masses of fruits hanging from the ends of such branches. There are records that *Duabanga* was introduced into the Indian Botanic Garden at Calcutta in 1801; the tree is still growing in Calcutta, but none of the original trees have survived.

15. THE INDIAN CORAL TREE

ERYTHRINA INDICA Lamk.

(*Family:* Papilionaceae)

English—*The Indian Coral Tree;* Hindi—*Pangli;* Bombay—*Pangara;* Malayalam—*Mandaram;* Tamil—*Maruka.*

THE INDIAN Coral Tree is one of the most colourful indigenous trees of peninsular India, particularly in the coastal areas. It comes into flower at the beginning of March, and may retain its coral red spikes through April and May. After the flowers come the leaves, which make this a valuable shade tree; leaves persist on the tree until winter.

POPULAR LORE

Among Hindus, the tree is supposed to flower in Indra's garden; the leaf with its three leaflets is said to represent the Hindu Trimurti, the middle leaflet representing Vishnu, the right one Brahma, the left leaflet Shiva. The leaf was popular with the early Christians in India as representing the Trinity, much as the Shamrock of Ireland did with the disciples of St. Patrick. Among the Portuguese the leaves of Pangara were known under the name of 'Folhas da Trindade.'

DESCRIPTION

A small to fair-sized tree, reaching under good soil conditions up to 15 m. or more in height; the branches are armed with very sharp prickles, at least when young. Leaves are rather large, consisting of a long stalk and three leaflets; the leaflets are broadly egg-shaped, often as broad as they are long, more or less acute at the apex, rounded or nearly so at the base, the terminal leaflet being much larger than the two side ones. Flowers come out when the tree is completely bare of leaves,

towards the end of February or beginning of March, and persist on the tree for two or more months; they appear in spikes at the very end of the branches, often several spikes coming out of the same branch. The colour of the flowers is generally bright red or scarlet. The calyx is also red, and forms a sort of a sheath round the corolla; when the flower opens out, the calyx splits the whole way down to the base. Petals are five in number, but the 'standard' is much the largest. Stamens are ten in number, and protrude a long way out of the corolla; their colour is about the same as that of the corolla. Pods are stout, at first green, at length deep brown or almost black, tapering at the apex and base, bulging out round the seeds; these are up to 12 in number in each pod, oblong and smooth. The fruit may remain on the parent tree for nearly as long as the leaves.

Cultivation

This is one of the easiest trees to grow either from seed or through vegetative propagation. The common practice is to select some good 'sticks' or 'poles' say 1–1.5 m. long, up to 10 cm. thick; plant such 'sticks' just before the monsoon. In planting care should be taken to see that what originally was the lower part is put in the soil, what was the upper part is left in the air; most plants are very sensitive to what technically is called their 'polarity'; sap in trees goes in one direction, from below upwards; cuttings should always be planted in such a way that this polarity is respected. Very soon after the beginning of the rains leaves will come out at the upper and roots at the lower end of the 'sticks'. On occasion I have noted a fence of barbed wire built round a field, the poles supporting the wires being from *Erythrina*. In the dry season that was just a plain fence; but as soon as the rains of the monsoon came down, most of the poles took root and burst into masses of leaves; thus a beautiful living fence was built. Even when the barbed wires rust and break away, the fence remains a good

one: the prickles on the stems and branches serve as a sufficiently good protection against intruders.

Cultivation through seeds in many cases is better; but naturally it is much slower, that is to say, it takes at least one to two years before the seedlings reach the sizes attained by using cuttings from the beginning.

Erythrina is often planted as a wind-break especially in places much exposed to strong winds. In some parts of India it is cultivated as support for various climbing plants such as the betel leaf, grape vines, pumpkins, jasmines or climbing roses. *Erythrina* being a leguminous tree, its roots enrich the soil with plenty of nitrogen; for this reason tea planters and others use the tree in their fields to improve the growth and yield of their plants.

The name, *Erythrina*, has been coined from the Greek, *Erythros* or *Erythrinos*, meaning red or coral red. The specific name, *indica*, meaning 'Indian' refers to the country of origin of the plant.

16. THE BANYAN TREE

FICUS BENGHALENSIS Linn.

(*Family:* Moraceae)

English—*The Banyan Tree;* Hindi, Bengali & Punjabi—*bar, Bor;* Marathi—*Wad;* Tamil—*Ala.*

THE BANYAN tree, to the scientific world *Ficus benghalensis* Linn., is so well-known all over India that at first sight it might appear presumptuous on my part to include it in the present series. The reason why I have taken it up here is that the tree offers a number of interesting details that may not be generally known to our tree-loving public.

The name, *Banyan tree,* used in the English language, needs some explanation. Originally the name seems to have been given by Europeans in the Persian Gulf to a particular tree of this species under which Banyans or Hindu members of the merchant class used to assemble for worship and business; gradually the name spread to other parts to indicate the species discussed in this chapter.

From immemorial times the poets and mystics of India have waxed eloquent in singing the praises of the Banyan tree. Modern poets have not lagged behind; let me quote a few lines from Southey:

"It was a goodly sight to see
The venerable tree
For o'er the lawn, irregularly spread,
Fifty straight columns propt its lofty head;
And many a long depending shoot,
Seeking to strike a root.
Straight like a plummet grew towards the ground...
So like a temple did it seem that there
A pious heart's first impulse would be prayer..."

Distribution

The Banyan tree seems to be indigenous in the sub-himalayan forests and in some of the slopes of the hill ranges in peninsular India. At present the Banyan is about the commonest tree planted along many of the roads of India, near temples and shrines, and in open ground near villages. Often the Banyan tree forms the rallying point for the village, the club-house where much of the social life and business of the community is carried out, and much of its gossip exchanged. Its cool shade affords welcome relief from the burning sun in the hotter parts of the country.

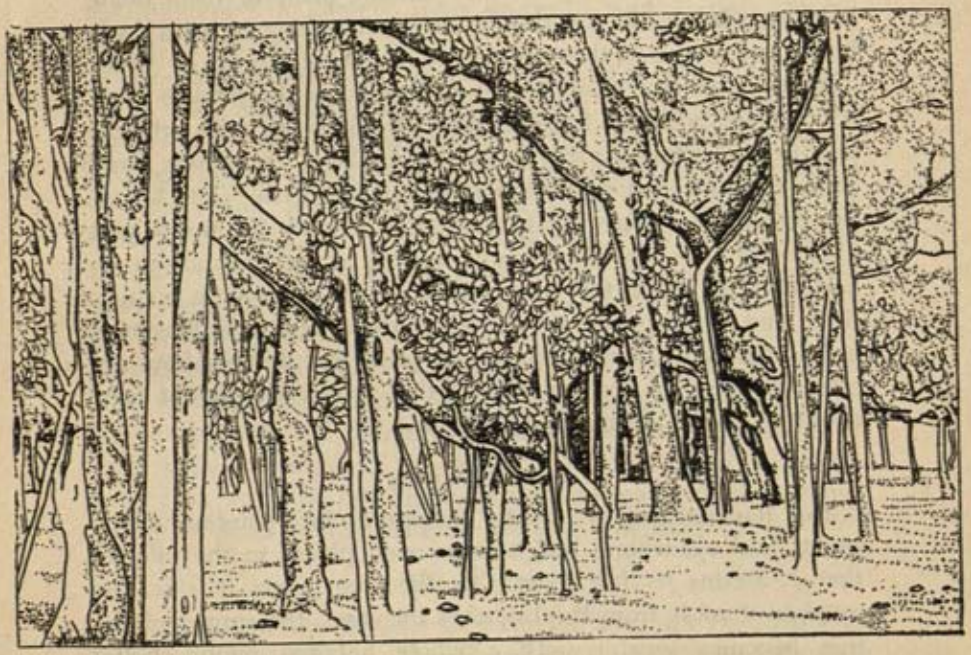

Plate 11 b. THE BANYAN TREE (*Ficus benghalensis* Linn. of Calcutta)

Description

It is "an enormous tree, 70 to 100 ft. high, sending down roots from the branches, which enter the ground and form trunks, thus extending the growth of the tree indefinitely." (Sir G. King in *Annals of the Roy. Botanic Garden, Calcutta* 1: 18, 1887). These roots coming out of the branches are at first as slender as cotton threads, but gradually after they have become anchored in the ground, such threads grow into mighty pillars that support the weight of the heaviest branches. Leaves are broadly oval in shape, smooth and shining when old, rather stiff and leathery, entire at the margins, more or less rounded at the apex and base, deep green above, somewhat paler beneath. Flowers and fruits are inconspicuous, very minute, many of them being held together in the fig; the fig strictly speaking is not a fruit, but a sort of pouch that contains hundreds of flowers or fruits. The real and true fruits of all fig trees are the minute 'pips' which cause so much trouble especially to people with artificial dentures. Technically the fig is said to be a composite fruit, consisting of very large numbers of minute fruits. The figs of the Banyan tree come out in the angle between the upper part of the leaf stalk and the stem or branch; at first they are green and hard, at length they turn red in colour and soft in texture. Birds and monkeys are very fond of these figs; their flavour is good, their taste for us humans is poor, and further they are often infected by hosts of insects that render the figs at least doubtful, if not positively dangerous.

In the Village

The Banyan tree is greatly favoured for planting along streets and elsewhere; but it is in open places in the villages that it attains its full glory. As the tree grows in size, the number of roots from the branches increases, the spread of the tree becomes greater until a whole batalion might shelter under the shade of some of the venerable old trees. There are some famous Banyan trees in India; in the Botanic

Garden, Sibpur, Calcutta, there is a tree known to have grown from a seed dropped on a Palmyra palm in 1782, of which Prain in 1900 gave the following dimensions: the original stem was then 15 m. in girth, the number of aerial roots was 464, in size from a few cms. to over 3.6 m. in girth; the circumference of the crown of the tree was about 377 m.; in 1965 the number of aerial roots was over one thousand (1044), the tree has not been allowed to spread freely, except over the road or garden path that goes all round the tree, that is to say, about 5–6 meters more or less in every direction giving in all a circumference of 416 m. There was even a larger tree some few kilometers from Satara in South Maharashtra; in 1882 the tree was 483 m. in circumference, its length from north to south being 181 m. and from east to west 134 m.

The Banyan tree is common along the streets of some towns like Bombay. But unfortunately many circumstances prevent the tree from developing to its full. In many places children use the aerial roots as free swings, thereby damaging the roots and preventing most of them from reaching the ground. During the hotter parts of the year cattle may be seen browsing on the tender roots, which again are prevented from reaching the ground. Further it is not possible to allow the tree to sink its roots in the concrete of our roads and pavements in the cities. All these trees do not get the benefit of the supporting roots; and in consequence they are often top-heavy, with the result that during the monsoon many of them come crashing to the ground. Within a few years we have seen some of the finest Banyan trees come down along the sides of Mahatma Gandhi Road in Bombay.

On Walls

The seeds of the Banyan tree carried by birds or otherwise may happen to fall on old walls in our towns; the seeds soon germinate, and thereafter, some strange sights may be seen. The tender roots try to get into little cracks or crevices in the

old wall, they are then quite harmless. But gradually such slender roots grow in thickness, and slowly but irrevocably the wall is split and cracked, often beyond repair. The walls of some of the old forts near Bombay are slowly being split by the roots of the Banyan trees.

The Underground Roots

This tree is a dangerous neighbour to have near our homes. The roots on reaching the ground normally grow downwards; but if there is a building in the immediate neighbourhood, they may grow towards the cool and moist soil beneath the building. I have often seen small houses being pushed up from their foundations by the roots of the Banyan tree; I have seen level paved verandas being cracked and made irregular by such underground roots. If you value the safety of your house, it is not advisable to plant Banyan trees in its neighbourhood.

As a Strangler

In the National Park, Borivli, near Bombay, and elsewhere in India, one can often see a Palmyra or Tad palm growing as it were from among the stems and roots of the Banyan tree. Unfortunately the palm is the innocent host that has given shelter and protection to the Banyan tree in its infancy; when the latter is strong and powerful, it turns on its host and strangles or throtles the palm tree. Some of the seeds of the Banyan tree may drop on the stem of the palm tree; during the monsoon such seeds germinate and send very slender threadlike rootlets to the ground; soon such rootlets encircle the stem of the palm tree with a delicate network. The roots of the Banyan grow in thickness until they become mighty ropes, and by then they press and squeeze the stem of the palm tree so powerfully that all the pipes that carry water from the ground to the crown of the palm tree get crashed and blocked. This simply means that the palm can-

not survive; it soon dies off, and its trunk rots away and disappears, leaving behind a strange, cage-like structure, formed by the strangler roots of the Banyan. *Ficus benghalensis* does much damage to important forest trees; for this reason foresters wage a constant war against the Banyan to keep it away from the forests. William Roxburgh, in 1832, wrote of this tree[1]: "Birds eat the fruit, and the seeds grow the better for having passed through them; if they drop in the alae of the leaves of the Palmyra tree ... they grow and extend their descending parts so as in time to embrace entirely the parent Palmyra, except its upper parts ... For such the Hindoos entertain a religious veneration, saying it is a holy marriage instituted by Providence."

[1] W. Roxburgh, *Flora Indica* 3: 541, 1832.

17. IVY-LIKE FIG

FICUS PUMILA Linn.

(*Family:* Moraceae)

IN THIS series we have dealt with two species of *Ficus*, namely *F. benghalensis* (the Banyan), and *F. religiosa* (the Peepal); but the series would in a way remain incomplete if we did not include a third species, one of the most striking fig-trees of the world, *Ficus pumila* Linn. This is quite a common plant in many parts of India, growing strangely enough not as a tree, but to all appearances like the Ivy plant, clinging to the bare walls and covering them with a dense mat of dark green foliage; in every respect it has the habit of the Ivy of European or Kashmir gardens, and is naturally known under the name of Ivy in Bombay and elsewhere. It is, however, a true fig tree or bush; if you do see the large luscious figs produced by this strange climber, you will be left in no doubt as to the identity of our Ivy.

It may, however, happen that even when you see the large figs produced by this plant, you may fail to recognize them as the fruits of the plant. This did in fact happen in Bombay, where *Ficus pumila* goes at times up the walls to the third floor of buildings. Some time ago I was asked by some friends: "Who on earth has thought of and contrived to stick some large figs on the ivy covering our walls". The answer was quite simple; no one had gone up to 'stick' such fruits on our ivy, the plant itself had produced them, our Ivy being in fact but a fig tree.

Ficus pumila Linn. is indigenous in Japan and China; it is frequently cultivated against walls and buildings in all parts of the plains of India. It is an evergreen plant that requires but little care once it is properly established; it does grow better on the cooler walls facing north.

Description

A perennial climbing or creeping shrub, rooting freely along the nodes of the stem and small-leaved branches. There are two types of leaves; on the barren or sterile branches the leaves are small, up to a little over 2.5 cm. long, 1.2 cm. broad; those on fertile branches may go up to 6–8 cm. long. 3–4 cm. broad. All leaves are stalked, rather thick, oval in shape, entire at the margins, blunt or nearly so at the tip; the nerves are strongly impressed on the upper, prominent on the lower side, more or less hairy on both sides. At the base of the leaf stalk there are two stipules, leaf-like in shape, but of a rusty colour. Receptacles or figs are borne only on the large-leaved branches; they are roughly pear-shaped, up to 5 cm. long, 3 cm. at the broadest; the apex is truncate with a boss-like structure at the centre of the very apex; the fig is supported by three large calyx-like bracts at the base. Young or immature figs are green, the ripe ones are of a beautiful purple colour. The fig contains large numbers of male and female flowers, the male ones near the opening at the apex each on a rather long stalk, the female flowers lining the rest of the fig on the inside. Male flowers consist of 2–3 tepals (colourless petals), and 2 anthers; the barren female flowers, also called gall flowers, have 4–5 tepals and a lateral stigma. Fertile female flowers are unknown in this plant.

Cultivation

The plant grows fairly rapidly, in a few years covering the walls of even a large building with a dense growth of dark green foliage. It is easily grown from layers or cuttings planted in pots and kept in the shade and watered until well established. It is advisable to prune off or trim fruiting branches, otherwise they come into fruit, and as they are not attached to the wall, they hang down in an untidy manner and by their weight may dislodge even other branches. The

double type of leaves may cause some trouble in the identification of the plant; small-or large-leaves plants are all one and the same plant, the small-leaved plants being sterile and more decorative than the larger-leaved fertile plants.

18. THE PEEPAL

FICUS RELIGIOSA Linn.

(*Family:* Moraceae)

It is with some trepidation that I am attempting to discuss the Peepal tree in the present series; the Peepal is one of the best known trees of India, it is planted in most villages of the country, and is held in high esteem by our people. Hindus and Buddhists hold the tree in veneration. In the popular folk-lore of India, the Peepal is considered as the female to the Banyan. The name *religiosa* has reference to the tree often being found near temples or shrines.

Description

This is a tree that reaches very large proportions, it is in fact about the largest of our indigenous fig trees. In its younger stages it is often epiphytic, that is, it grows on other trees, which are gradually strangled by its rope-like roots. Or the tree may grow in cracks on walls, which are slowly but inexorably cracked and split open by the growing roots. On this subject, Nairne, the author of a popular book on the flowering plants of western India, writes: The Peepal "is... the most destructive of those plants which flourish

'On gray but leafy walls, where ruin greenly dwells'.

(Byron)"

The Peepal does not have the aerial roots so typical of the Banyan. Leaves and young branches are smooth and more or less shining; the leaves are somewhat leathery, broadly oval in shape, suddenly narrowed at the apex into a long tail; the base is rounded or heart-shaped; the stalk of the leaf is about as long as the tailed apex. The nerves of the leaves deserve attention; in addition to a stout midnerve, there are 5–9 lateral pairs which unite at their ends to form a wavy line near the

margin of the leaf. The leaves are generally pendulous, that is, hanging down, and are such that a slight breeze sets them all quivering and trembling, like the leaves of the aspen tree of northern countries. There can hardly be a more peaceful scene than a peasant, at the end of a long day of toil in the fields, sitting under the village Peepal and being lulled to sleep by the rustling of its leaves.

Receptacles or figs come out in pairs at the angle between the leaf stalk and the branch; at first they are green and smooth, finally they turn purple when ripe; the figs are but about 12 mm. across. Each receptacle or fig contains but a few, at times very few, male flowers near the opening at the apex; each flower consists of a single stamen supported by three minute colourless 'petals'. The female flower consists of five 'petals' enclosing a pistil. As stated for the Banyan, the real fruits in all fig trees are the tiny pips, which may be seen when the fig is split open; such pips have the unfortunate habit of getting lodged between the teeth, when figs are eaten. Birds are rather fond of the Peepal fruit; the seeds pass out undigested and are scattered all over the country. Under conditions of sufficient moisture, such seeds germinate in the most unlikely places.

Age of The Peepal

Every villager knows that the Peepal has a very long life, compared with other common trees. There are records, however, of a tree taken to Ceylon from Northern India in 288 B.C.; at the end of the last century the tree was still living and doing well; in 1852 it was, not just supposed, but known to be 2147 years old. Such a tree was at the time either the oldest or one of the oldest trees of the whole world, it was certainly the oldest tree the records of whose growth had been carefully preserved all through the centuries to near the present time. There seems to have been a tradition in Ceylon that the ruling dynasty would last in power as long as the sacred Peepal remained alive; this accounts for the care with which the tree was looked after for so many centuries.

Plate 11a. THE BANYAN TREE (*Ficus benghalensis* Linn.)
(*See page 62*)

Plate 12. IVY-LIKE FIG (*Ficus pumila* Linn.)
(*See page 68*)

Plate 13. THE PEEPAL (*Ficus religiosa* Linn.)
(*See page 71*)

Plate 15. GLIRICIDIA (*Gliricidia sepium* Walp.)
(*See page 76*)

Sacred Tree

It was, according to tradition, under this, the BO tree, that Gautama Buddha sat in meditation at Bodh-Gaya; unfortunately the original tree has disappeared, and is now replaced by a successor. Hindus consider the Peepal a sacred tree, so that to cut a tree or its branches is to them as wrong as to illtreat one of the sacred cows of the country. Even when the tree is causing much damage to buildings and in forests, the Peepal is respected and will not be cut down by orthodox Hindus. On the other hand, any Hindu who plants a peepal tree will be blessed by generations to come, who will enjoy the shade of the hospitable branches in the heat of the day.

Cultivation of The Peepal

Propagation of the Peepal is very easy; it may be done by seeds or by cuttings; natural regeneration takes place through the seeds scattered by birds. Cuttings, even large pieces, can be used with advantage. The Peepal is a good avenue tree, but it should not be planted near buildings, as the roots of the tree may pass under the walls and gradually push them up, which naturally is not very good for the safety of the walls. It is not a good tree for places where the water table is just below the surface as it happens in many of our Bombay streets in the Fort area or in Calcutta; under such conditions, the roots do not go deep but spread out just below the surface of the ground, with the result that many a Peepal tree is uprooted even by moderate monsoon winds.

The Peepal is found wild in the forests on the lower slopes of the Himalayas from Punjab eastwards; also in Bengal, Orissa and the Circars, and in Central India; it is planted and run wild in most parts of India. There are some fine trees along the streets of Bombay and other cities in India; many vigorous seedlings can be seen on some of the older buildings in our cities.

19. GARUGA

GARUGA PINNATA Roxb.

(*Family:* Burseraceae)

Hindi—*Kaikar;* Marathi—*Kudak;* Malayalam—*Kosramla;* Tamil—*Karvambu;* Telugu—*Garuga, Gargu.*

THE NAME *Garuga* has been taken from the vernacular; *pinnata,* meaning 'feather-like', refers to the compound leaves with a central rachis and lateral leaflets. The tree is common all over peninsular India, especially in mixed deciduous forests, but is nowhere abundant, ascending to 1000 m. It is occasionally planted along road sides.

DESCRIPTION

An elegant tree reaching 10 m. high, in the forest much higher. Leaves 15—40 cm. long, turning red and falling off in the cold season; leaffets 6 or more pairs and a terminal one, unequal-sided, green when young; at length many turn bright red and may be covered with red galls due to insect attack. The flowers appear when the tree is leafless at the beginning of the hot season in large clusters at the ends of branchlets; flowers are yellow or yellowish. The fruits are globular, at first green, at length yellow or black, about 15—20 mm. across.

USES

The fruits are eaten raw or pickled, but are strongly acid; the fruit 'is considered a semi-medicinal article of diet' (J. Murray). The bark and especially the red leaves and their red galls are used for tanning. The wood is liable to insect attack; it is often used as fuel.

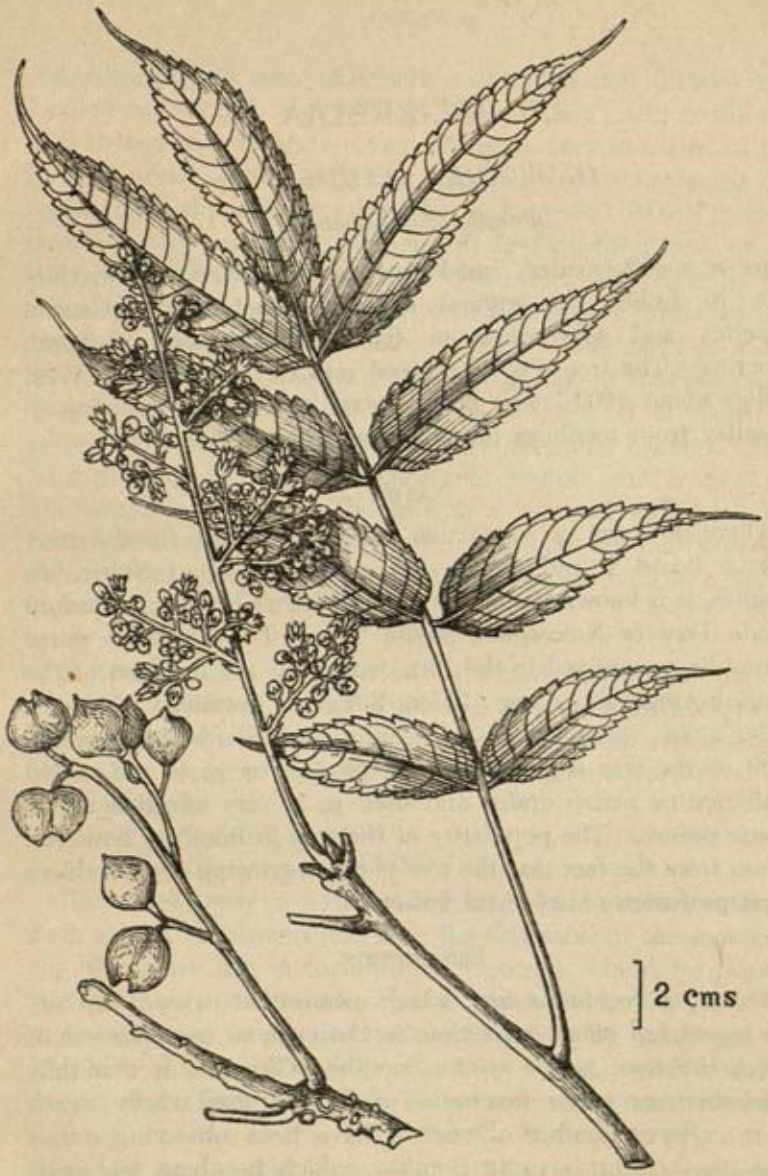

Plate 14. GARUGA (*Garuga pinnata* Roxb.)

20. GLIRICIDIA

GLIRICIDIA SEPIUM Walp.

(*Family:* Papilionaceae)

THIS IS a soft-wooded, quick-growing tree of recent introduction in India. Its original home is Guatemala in Central America and southwards to the northern parts of South America. The tree was introduced into Ceylon from the West Indies about 1900; some fifteen years later it was growing in Bombay from seedlings brought over from Ceylon.

NAMES

There is as yet no vernacular name in Bombay for this tree; I have heard it referred to at times as *Vilayati Shiris*. In English, it is known under the names *Mother of Cocca, Madura Shade Tree* or *Nicaraguan Shade Tree*. The scientific name *Gliricidia* was coined in the 18th century as a translation of the Spanish-American name "Mata-Raton" meaning "Mouse-Killer". In various parts of Central and South America the bark of the tree is ground into a powder or paste and mixed with rice or maize grains and used as a very effective rat or mouse-poison. The popularity of the tree in Bombay, however, comes from the fact that the tree is quick-growing and produces great profusion of colourful flowers.

DESCRIPTION

This is a deciduous tree, which means that most, if not all, the leaves fall off at some time in the year; in coastal areas of India, the time is the winter months. *Gliricidia* is a middle sized tree, or under favourable conditions may easily reach 20 m. For a number of years I have been observing a few trees in the Fort area in Bombay, which in about ten years have reached over 18 m. in height. The leaves are compound,

consisting of 7–8 pairs of leaflets with a terminal solitary one. Leaflets are roughly oval in shape, more or less acute at the tip; at first they may be softly hairy, at length they are hairless but for the nerves or veins on the underside. Flowers come out when the tree is more or less bare of leaves, from January onwards; they are pink, or purplish or lilac in colour, or all these colours may be seen on the same tree, depending on the stage of development of the flowers. The bare branches get covered with great profusion of flowers. The calyx is small, often under 6 mm. long, cup-shaped, the rim of the cup being smooth or shallowly 5-lobed. Petals are typical in shape, as is the rule in the Pea Family, to which *Gliricidia* belongs, about 20 mm. long; the standard curves backwards and is more or less deeply two-lobed. The fruit is a 2-valved long pod, but is not often seen in Bombay. The best time for the flowers is February to April, but often they may be seen well into May.

Uses

In various parts of America, as stated above, the bark is used as rat-poison. In India the tree is often cultivated as an avenue tree, or for its shade, or as a wind-break at the edges of banana or other crop fields. The leaves are very good for green manure.

Cultivation

This is very easy in India, either from seeds or from cuttings. Both should be planted just after the first rains of the monsoon, and thereafter left to themselves. Cuttings should be planted 2–3 m. apart, or even closer; this forces the young plants to shoot upwards rather than side-ways. Careful pruning will keep the tree in good shape for many years; otherwise the weight of the flowers or of the leaves may cause many branches to break, as the tree is soft-wooded. With appropriate care *Gliricidia* may quickly grow into a very beautiful ornamental tree for avenues or edges of gardens. The tree thrives on

practically any type of soil; but on rocky soil it may remain rather stunted. Where the soil is poor, it is best to plant the cuttings in fairly large holes, anything like 1 cubic meter, with good soil or manure; once the cuttings have become established, they may be safely left to themselves. Artificial watering should not be done, otherwise the seedlings may find it impossible to tide over the dry season without constant watering.

21. THE QUEEN'S FLOWER

LAGERSTROEMIA SPECIOSA Pers.

(*Family:* Lythraceae)

English–*The Queen's Flower;* Hindi, Bengali–*Zarul;* Marathi–*Taman;* Tamil–*Kadali;* Telugu–*Varagogu.*

SOME YEARS ago, whilst travelling in the neighbourhood of Jog Falls in North Kanara, I received one of the most pleasant surprises I have experienced in my tours through many of the forests of India. When crossing the stream by the ferry boat some distance above the Falls, my attention was attracted to some deep red or purple colour patches in the midst of dense forest. After crossing the stream, we went to investigate the source of the colour. We found some very large trees, well over 20 m. tall, in full bloom, the whole tree being covered, as it were with a mass of colour. It was the Queen's Flower, *Lagerstroemia speciosa;* the ground below the tree was strewn with a carpet of flowers, and this added to the attractiveness of the tree. In city streets the tree seldom grows over 6 m. in height, and the colour is predominantly purplish or purple; in its native haunts in North Kanara the flowers were much lighter in colour and were produced by a tree of gigantic proportions.

DESCRIPTION

Along city streets and in gardens this tree is generally 7–10 m. high, with a straight trunk of a pale colour. Leaves are simple and large, a good average being 15 cm. long and 6–8 cm. broad; the shape of the leaf is somewhat like that of the Mango tree, but a little broader, tapering into a narrow point at the tip; the stalk of the leaf is short and stout. The surface of the leaf is clearly marked with a midrib and 10–12 pairs of side

Plate 16. THE QUEEN'S FLOWER (*Lagerstroemia speciosa* Pers.)

nerves, which towards the edges of the leaf turn upwards and join into a wavy line near the very edge of the leaf.

This is a deciduous tree, that is, the leaves fall once a year, but not all at once; they generally fall during February and March, at which time leaves may turn somewhat reddish or yellowish in colour; fresh leaves appear with the young blooms some time in May. Flowers are in long clusters or panicles, at the very ends of the branches, and the panicles are well over 30 cm. long. The first flowers to open are those near the base of the panicle, the last those near the apex of the same. The colour of the flowers, as stated above, is predominantly purplish or decidedly purple or mauve. There is another species of the same genus, *Lagerstroemia indica* (the Common Crepe Myrtle) which is preferred for city streets, as the tree is smaller and more compact; the flowers of the latter are more reddish. The calyx supporting the flower is green, with a soft whitish bloom or down; the sepals are more or less united to form a strongly ribbed cup. Petals are purplish, strongly veined, spreading from a very narrow base, the edges being entire or more or less fringed or wavy. Stamens in the middle of the flower are numerous, reddish or yellowish in colour, and shorter than the corolla; anthers at the tip of the filaments may be reddish or purplish in colour. The fruits are small, roughly about 2–3 cm. long, more or less globular, rounded or somewhat pointed at the tip, often with the remains of the style; fruits come out at the beginning of the monsoon, and may remain on the tree till the next flowering season.

Flowering Season

The normal flowering season is the hotter part of the year just before the monsoon; in some of our city streets flowers may be seen even during the rains till well into September. On account of the profusion of flowers and the length of time during which they are available, this is a good avenue tree. In cultivation it is found all over peninsular India, roughly from

Bombay southwards to Cape Comorin.

Distribution

The tree is indigenous in the Western Ghats from about Belgaum southwards through North and South Kanara to Malabar and Travancore, in evergreen forests, especially in the neighbourhood of rivers and streams. It is also found in Ceylon, Burma and eastwards to the Malay Peninsula, Australia and northwards to China.

Uses

The tree is of economic value on many counts. Its flowers make it a valuable one for gardens and avenues. Its timber is particularly good on account of its properties under water; for this reason it is used in harbour piles and posts, in the construction of boats and canoes, and in general for structures that have to be in constant or frequent contact with water. In Burma this tree is considered second only to teak in economic importance. Medicinally the tree is useful; the seeds are reported to be narcotic, the bark purgative; the root is used in the treatment of fevers and dysentery; lately it has been reported that all parts of the tree are useful in the treatment of diabetes.

22. THE MAHWA TREE

MADHUCA INDICA Gmel.

(*Family:* Sapotaceae)

VERY FEW trees in India are more useful or more stately than the Mahwa tree; every part of the tree yields an economic product of great value to the people in whose neighbourhood it grows. In the various Indian languages the tree is known under the names of *Mahwa* or *Mahua* (in Beng., Bombay, M.P., etc.); *Mahuda* (Guj.); *Illipe* (Tam.); *Ippi* (Tel.); *Madhuka* (Sansk.). Scientifically in some of the older books, the tree is listed under the name of *Bassia latifolia* Roxb.; in modern books, the name has been changed to *Madhuca indica* Gmel.; the name *Bassia* had been previously used by Allioni (1766) for a small plant of the family Chenopodiaceae, and in consequence, it should not have been used for our tree; one fundamental rule in naming plants is one name for each plant, and one plant only for each name.

DISTRIBUTION

The tree is indigenous in Central India, in Gujarat and along the Western Ghats, eastwards to Chota Nagpur, it is not common in Bengal, nor in Madras. It is very commonly planted all over peninsular India.

DESCRIPTION

Large deciduous tree reaching 20 m. in height with a spreading crown. Leaves clustered near the ends of the branches, each 7–20 x 3–7 cm., elliptical in shape, slightly hairy when young, at length glabrous. Flowers appear in dense fascicles near the end of the branches, usually when the tree is leafless; flowers are stalked, drooping, rusty pubescent; calyx about 1.5 cm. long divided nearly to the base, segments usually 4; corolla cream-

Plate 17. THE MAHWA TREE (*Madhuca indica* Gmel.)

coloured, about 2.5–3 cm. across, fleshy; the lobes of the corolla about 8–10. Stamens about 25. Ovary hairy supporting a style 2.5 cm. long or longer. The fruit is fleshy, hairy, 3–5 cm. long, ovoid in shape, at first green, at length reddish-yellow or orange. Seeds 1–4.

Uses

The timber is hard and good, but is seldom used in India because the other products of the tree are much more valuable. Flowers are edible either raw or cooked or made into cakes. Dried flowers, when properly soaked in water and allowed to ferment, produce on distillation a spirit which has many applications in our country; the flowers, however, have an unpleasant odour which is transmitted to the spirit even after distillation, and this odour somewhat restricts the use of the spirit thus obtained. Wild animals, such as jackals, pigs, deer, etc. are rather fond of the flowers; bears are particularly fond of them and it is on record that bears will eat quantities of flowers which gradually will start fermenting in the stomachs of the bears with the result that the poor animals get thoroughly drunk; people, who have seen bears under such conditions, say that bears then behave in the accepted way of drunkards. The fruit and all its parts are used economically; the outer fleshy portions are used as an article of food by some of our hill tribes particularly in Western India; from the seeds, an oil is extracted by pressure, which is used for lighting, and as a cooking oil by Central Indian tribes; this oil is at times used to adulterate ghee. Oil from the seeds of Mahwa is used extensively in the manufacture of soaps. Of recent years, some of the soap producing firms in India have taken to the use of Mahwa oil as one of their raw materials.

The Mahwa tree is a very important source of food for the Gonds and other tribes in Central and Western India; the tree is particularly important because flowers and fruits appear in the hot season when rice stocks may be very low. It is reported

that under Maratha rule, it was a common practice to cut down the Mahwa trees in the hilly areas of the country so as to reduce lawless hill tribes by starvation. In Western India, of recent years, many Mahwa trees have been cut down by Government orders in order to prevent illicit distillation by the local people. This is to be deplored, for the tree is a valuable source of food, of timber, and reproduces and grows with little or no care in even poor soils; cutting down of trees has not taught our people temperance.

23. THE MANGO TREE

MANGIFERA INDICA Linn.

(*Family:* Anacardiaceae)

ANY BOOK on Indian trees would not be complete if the Mango tree was excluded. It is true that normally this tree is not used as an avenue tree in our towns and cities; it is, however, often grown as a roadside tree, and this alone justifies its inclusion in the present series. In many of our villages the mango tree forms the trysting spot where much of the community life of the village is carried on and gossip is exchanged, in many areas replacing the village banyan tree.

Mangifera is found wild or cultivated all over peninsular India from the lower slopes of the Himalayas in the north to Cape Comorin in the south. Judging from references in the literature and sculpture of India, the tree has been cultivated in this country for thousands of years. Its original home is still a matter of dispute among the experts, though they generally agree that the mango tree comes from South or South East Asia and Malaya; at present the region Assam–Burma is considered as about the most probable original home of the mango tree.

NAMES

Linne in the 18th century named the tree *Mangifera indica*, meaning 'the Indian mango-bearing tree'. In English and other European languages the tree is known as the *Mango* tree, the name apparently being derived through the Portuguese form the Malayan *Mangga* or the Tamil *Manga*. In Sanskrit literature the tree has been known under many names, among them *Amra, Chuta, Rasala*, etc. In many of the northern Indian languages, the tree goes under the names of *Am, Amb, Amba*, etc.

Plate 18. THE MANGO TREE (*Mangifera indica* Linn)

Uses

In the literature of India there is scarcely a tree that has been more highly celebrated than the Mango tree. It has been referred to as 'the wish-granting tree'; its name has been used as a symbol of love and devotion for persons or objects; its blossom has been mentioned by Kalidasa and other poets as one of the darts of *Manmatha,* the god of love. Indian art and sculpture have left magnificent representations; it is enough to cite here the stupa of Sanchi of about 150 B.C. which shows the tree and its fruit in some of the more striking architectural groups.

The mango is justly considered the king of fruits in India. At present many varieties are grown all over the country; some of these are used for 'sucking', the juice being squeezed out of the fruit, which on account of its many fibres and little flesh is not considered good enough for eating. Young fruits are sliced and pickled, both the seed and the flesh being used. One of the finest *chutneys* of India is prepared from ripe mangoes. Lately the canning industry has taken up the mango fruit, and has very successfully made it available the whole year round. From somewhat unripe mangoes a delicious drink is made with milk and sugar, which goes under the name of 'mango-fool' and when properly cooled is very popular in the hot season. In recent years the aerated water industry has put on the market a number of mango extracts, which are among the finest 'soft' drinks of India. What shall I say of the ripe mango as a fruit? I shall only say that this for us in India is the real *Theobroma,* in the sense of the original Greek word, meaning, *the food of the gods.* Foreigners coming to India find the mango a delicious fruit, though somewhat difficult to handle; a recent English writer recommends as the only safe way of eating a mango to strip and get into a bath tub, and then tackle the slippery fruit at leisure.

Mango Species and Varieties

The edible varieties of mango and most of our wild trees are all derived from *Mangifera indica*. In India we have but two species of *Mangifera*, the common *M. indica* Linn. and *M. sylvatica* Roxb.; the latter is found mostly in N.E. India, and its fruit is not edible. Considering *Mangifera* in its world wide distribution, botanists have variously listed the number of species from 32 (Engler and Prantl, 1897), or 41 (Mukherjee, 1949) to 65 (Hooker and Jackson, 1895). As for the number of varieties, it is almost impossible to say how many there are in the world; some 500 of them have been described from India alone, but the distinction between one variety and the next is a difficult matter; the reason for the difficulty is that authors and growers have used different criteria for naming their varieties, and growers, in addition, have often adopted for their fruits the names of very well-known varieties from other parts of the country with which their own varieties have little or no relation.

Of the many cultivated varieties of mango, the *Afooz* or *Affonso* of Bombay stands very high among the best in the country; if market prices are an indication of quality, then the *Afooz*, which sells for as much as Rs. 16 per dozen, must be very good indeed; in April–May, 1965, these mangoes fetched over Rs. 40 per dozen in Bombay. In general the following are considered by experts among the very best varieties of mangoes in India: the *Afooz* and *Pairi* in the western parts; *Neelum* and *Banganpally* in the southern parts; *Mulgoa* and *Suvarnarekha* in Andhra; *Chowsa*, *Dusehri* and *Langra* in U.P. and Bihar; *Gulab Khas* and *Bombai* in Bengal. As regards fruit size, however, the *Tenneru* variety of Andhra is the king among Indian mangoes, with a weight of about 1.6 kg. and a length of nearly 23 cm., but otherwise this variety is not remarkable for its quality and flavour.

Description

The mango tree is large, with spreading branches, 6–15 m.

high, though in dense jungle it often attains gigantic sizes of 30 m. or more. Leaves are alternately inserted all along the branches, but are apt to be more dense near the ends of the same, and are rather stiff in texture and shiny, 12 to 30 cm. long, 3 to 9 cm. broad, more or less lance-head in shape, tapering both to the apex and base, the edges somewhat wavy; the leaf stalks or petioles are 1 to 5 cm. long. Flowers are small and inconspicuous taken singly, but they appear in large branched yellowish inflorescence panicles at the ends of branches. Sepals are small, concave, yellowish green, slightly hairy on the outside; petals yellowish green with a touch of pink or purple at base and sides, oblong; stamens 4 to 5, unequal, one of them much larger and fertile, the rest usually sterile and reduced to a mere stalk; the fertile stamen consists of a long filament or stalk and purplish anther. The whole flower is only about 6 to 8 mm. across when fully opened, and at times has a rather disagreeable odour. The fruit is what is technically called a drupe, that is to say, it is a fleshy fruit with a large stone in the middle; the quality of the mango depends on the flavour of the flesh and the absence of fibres; in shape the mango is generally heart-shaped, but in practice most varieties have their own shape and size. Most unripe fruits possess a strong flavour of turpentine, which disappears in the ripe fruit of the better varieties.

Cultivation

The usual method of cultivation is by grafting or layering, that is to say, it is through vegetative reproduction. If seeds of even the best varieties are sown, the resultant seedling may be, and usually is, quite different from the parent plant, and its fruit seems to revert to the wild type from which the cultivated varieties have been derived.

In many parts of India the mango tree is badly affected by the parasite *Dendrophthoe falcata* or its variety *coccinea;* seeds of the parasite are carried by birds from tree to tree, and

infection is common and widespread even if only one parasite is left in the district. The parasite produces large unsightly galls, in fact large cancerous growths, on the mango tree; if infection is heavy, the mango tree will practically cease bearing fruit. The more effective control method against this harmful parasite is constant and careful pruning. In many parts of peninsular India, the mango tree acts as support for numerous orchids, such as *Vanda, Acampe*, etc. which do no harm to the mango tree and deck an otherwise sombre tree with glorious flowers during the hot season of the year.

24. PERSIAN LILAC

MELIA AZADERACH Linn.

(*Family:* Meliaceae)

English—*Persian Lilac, Bead-Tree, Bastard Cedar;* Bombay—*Bakan-nimb;* Bengali—*Bakarjam;* Hindi—*Baken.*

This, the Persian Lilac, is often confused with the true Nimb, *Azadirachta indica;* the structure of the leaves and the colour of the flowers, white in Nim, lilac in *Melia,* at once distinguish one tree from the other.

A large evergreen tree, wild in the sub-Himalayan tracts, but introduced into cultivation not only into India but into most tropical and sub-tropical countries of the world. In India Muslims are credited with the spread of the tree. In Bombay gardens and streets, the Persian Lilac attains a height of 12–15 m.; the wide-spreading branches make this a valuable shade tree. The flowers are showy and slightly scented, though small in size.

Description

Leaves alternate, bi- or tri-pinnate, of a bright green, 18–35 cm. long; the leaves consist of a number of pinnae or leaf-like sub-divisions, which themselves may be subdivided into leaflets; these are more or less oval in shape, toothed at the margins, finely tapering at the tip, more or less unequal-sided at the base; the leaflets or even the pinnae are opposite each other on the main axis of the compound leaf; the whole leaf is devoid of hairs, and shining green. The flowers are slightly fragrant, lilac in colour, in panicles or bunches that are about as long as or longer than the leaves themselves; the pedicel or stalk of the individual flowers is slender and about 2.5 cm. long; flowers about 2–2.5 cm. across when fully open. The petals are oblong or somewhat strap-shaped, the lilac colour being deeper towards the tips or upper middle half of the same, the base being pale

lilac or nearly white. The stamens are united together to form a tube, which appears in the centre of the petals and is somewhat flask-shaped, that is to say, bulging a little below the middle; the stamens are placed on the rim of the flask, and are 10 in number. The fruit is a drupe, a soft fleshy fruit with several, usually 4, stony seeds immersed in the flesh or pulp of the drupe.

Properties of the tree

The Persian Lilac is a very elegant tree, even when not in flower, and for this reason, it is often cultivated as an avenue or shade tree in various parts of India and elsewhere; when it is in flower it is a fine sight, though the flowers on account of their small size are not showy. The trunk of the tree, when duly incised, yields a gum which is at times used in place of the gum of the Nim tree. The juice of the leaves is used as a remedy against intestinal worms, though its taste is rather strong and not pleasant. The fruits are said to be poisonous to man, but are greedily eaten by goats and sheep with apparent impunity. One of the more common and important uses to which the fruit is put is the manufacture of chains of beads or necklaces or rosaries; in popular belief such necklaces act as a charm against certain infections. Be that as it may, a decoction of the fruits, leaves, etc., is used in India as a preservative against the attacks of insects on dry fruits, clothing, etc.

The Persian Lilac is rather accommodating in the type of soil required; if the tree is properly looked after in its initial stages, it can thrive in practically any type of soil and climate, provided the climate is not too cold. It does very well in Bombay and in its neighbourhood, in the drier parts of the Deccan and in most of Peninsular India.

Flowers come on about the month of April and may last for two or more months; but since the flowers are not very large nor striking, the tree is cultivated for the sake of its leaves, and these are evergreen.

25. IRON-WOOD TREE

MEMECYLON UMBELLATUM Burm.

(*Family:* Melastomataceae)

THERE ARE several species of the genus *Memecylon* in Bombay, and they all go under the local name *Anjan;* in English the tree is sometimes known as the *Iron Wood Tree,* a name that may at times cause confusion, as it is also applied to *Sideroxylon* or *Xantolis.* Some of the older botanical books list the present tree as *Memecylon edule* or *M. tinctorium.*

Anjan is cultivated in Victoria Gardens and elsewhere in Bombay, although it is not common; I have not seen it along avenues or roads. On the other hand, this is one of the commonest small trees on the Mahableshwar plateau and other hilly areas of the Western Ghats.

During the months of March and April, I have had occasion to see and admire these trees at Mahableshwar; some of them were literally covered with masses of flowers, each of which may be minute in size, but the whole combined effect of flowers and leaves lends plenty of colour to open slopes.

DESCRIPTION

A small to middle sized tree, usually about 6 m. high, occasionally going up to 12 m. Young branches and stems round and smooth, older ones more or less cracked and rough. The general appearance of the tree when in leaf only is somewhat sombre, on account of the dark green colour of the leaves; the tree is evergreen. The leaves are stiff and leathery in texture, smooth or glabrous (that is to say, without any hairs on the surface), the edges entire, the whole leaf blade in shape being more or less oval, pointed at both ends; there is one prominent midnerve running from the base to the apex of the leaf, other nerves being present but rather obscure; the leaf stalk or petiole

is up to 6 mm. long. Flowers very numerous, in compact ball-like sprays 3–5 cm. across; flowers come out either near the base of present leaves or along the bare branch near leaf scars. Buds are at first green in colour; later on they take a bright light purple or rose colour; when the petals open out, they are deep blue on the inside. The calyx is but 2–3 mm. long; the corolla consists of 4 petals, each broadly ovate in outline, the whole corolla, when fully expanded, scarcely reaching 5 mm. across. Stamens 8 in number, of the same colour as the corolla or slightly paler. The fruit is a spherical berry, in size about 6 mm. in diameter, in colour varying from plain green to purple, turning almost black at maturity. Flowers appear during the hot season; fruits ripen at the beginning of the monsoon.

Distribution

On the Mahableshwar plateau this is one of the commonest constituents of the forest on open slopes all round Yenna Lake. In Khandala the tree is also found on open slopes, but it is particularly abundant on Behran's Plateau. In Matheran, *Anjan* is quite common in places where the forest is not dense. In all these places *Memecylon* takes over when the forest has been chopped down and destroyed; the presence of this tree on any slope may, then, be taken as a definite indication of some previous ill-treatment of the forest. On the other hand, we must commend this tree for the good work it does in protecting the soil, when humans have thoughtlessly exposed it to the ravages of erosion.

Uses

The first and most important use is in the protection of hilly slopes, from which other trees have been removed. The ripe berries of *Anjan* are edible, they are eaten in time of famine, and they are quite safe. The leaves have for long been employed in India by the dyeing industry: wool, silk, and even grass mats can be nicely dyed; leaves used in conjunction with

myrobalans give a deep red colour, used with a tin mordant yield a yellow colour; if no mordant is used, they produce a light brown colour. Medicinally the leaves are used in the treatment of gonorrhoea, or mixed with several other ingredients, make good fomentations for external use. The timber is hard and close-grained, durable and valuable for many purposes, but difficult to work. In general appearance the timber looks rather similar to Boxwood.

To add to the beauty of the tree and its flowers, it is worth mentioning that *Anjan* seems to be very popular with several species of orchids; in Mahableshwar during the month of March, I have noted large numbers of *Dendrobium barbatulum* and *Dendrobium microbulbon* in flower. In Khandala, for many years, I have noted some trees with their trunks and branches literally covered with various *Erias* or *Dendrobiums* during the monsoon; on one occasion, I counted over 200 *Eria* orchids on one Anjan tree, and then gave up counting, although this figure represented less than 1/3 of the total number seen on the tree.

As mentioned above, this tree is in full bloom in Mahableshwar in the middle of March; it is one of the most attractive sights of the place, not as vivid in colour as the *Flame of the Forest*, nor as abundant as the *Carvi* plant, but all in all it is a fine sight.

26. MUSSAENDA

MUSSAENDA FRONDOSA Linn.

(*Family:* Rubiaceae)

Hindi–*Pedina;* Bengali–*Nagbali;* Marathi–*Bhutkas* or *Bhutkesa;* Tamil–*Vellaiyilai;* Malayalam–*Parathole.*

WHILST TRAVELLING through the Western Ghats or the Nilgiris or in the neighbourhood of Darjeeling, one may often see a fairly large shrub or small tree with deep green leaves, among which there is an occasional large pure white or creamy white leaf. The large white leaf is the result of the enlargement of one of the sepals or calyx leaves. Such trees belong to the genus *Mussaenda*. Under cultivation, we can occasionally see other species, in which the colour of the calycine leaf is more or less yellow or cream or white. There are at least two species of *Mussaenda* common in various parts of India, one is *M. frondosa* Linn., the leaves of which are definitely hairy, and the other *M. glabrata* Hutch. where the leaves are completely hairless. In Calcutta Botanic Garden, there is a species from the Philippines which is one of the more colourful sights in the Garden.

DESCRIPTION

An erect shrub or small tree, 2–6 meters high; occasionally at the edges of the forest it becomes a rambler, climbing by its flexuous branches. The plant belongs to the group of the Rubiaceae; this means that the leaves are opposite, that is, they come out in pairs. Leaves elliptic or oval in shape, up to about 12 x 8 cm., more or less hairy above, more so on the nerves beneath, rounded or somewhat tapering at the base, tapering at the apex; the midrib is prominent on both sides; side nerves about 8 pairs, coming from the midnerve at an angle and curving upwards towards the leaf margins; the upper surface of

Plate 20. MUSSAENDA (*Mussaenda frondosa* Linn.)

the leaf is deep green, the lower one paler. Flowers are not large, in the wild plants usually orange in colour inside, greyish outside, in fairly large and open cymes, or in non-technical terms, in large loose bunches. The calyx consists of 5 sepals about 12 mm. long in flower; gradually one of the sepals, usually towards the outside of the cyme or bunch, begins to enlarge into a leaf-like structure, which finally may be as large as the normal leaves of the plant; the colour of this calyx leaf is usually creamy white, turning to a dirty white and persisting on the plant when all other sepals have disappeared; at that time this calycine leaf may be seen to be coming out, as it were, from the top of the fruit. The corolla is 2.5–3.5 cm. long, a very slender tube expanding into a star-shaped five-pointed structure; the outside of the tube and limb of the corolla is greyish-white in colour, the inside of the expanded portion at first bright orange, gradually fading into a poor or dull yellow; books call this a "golden yellow", and this is true if you have some imagination when looking at the flower. The fruit is a berry, 10–15 mm. in size, more or less globular or egg- or pear-shaped, at first green, at length black; seeds many, minute, immersed in reddish spongy tissue.

The plant is wild in the tropical Himalayan region, and throughout the peninsula of India along the western Hills down to the South. It is often cultivated in gardens.

Properties

Dymock in his *History of the Principal Drugs of Vegetable Origin* writes of this plant: "This is a well-known scandent shrub, and easily recognized by its orange-coloured flowers, which contrast prettily with the white calycine leaf, making it a very remarkable object. All the flowers do not produce this leaf-like sepal, but two or three in each corymb, and occasionally two sepals are thus developed. *M. frondosa* is called *Srivati* in Sanskrit, and is a favourite of the goddess of fortune, from its bearing the white mark of Vishnu or Krishna. Another name

for it is *Nagavalli*. The flowers are used in country places to make the garland which is tied over the doorway on festive occasions. Medicinally the whole plant is fairly often used in these parts of India; the juice of the leaves and fruits is used as an eye-wash and is said to remove opacities in the eye; externally the same juice is applied in boils and skin ulcers, and it is said to be effective in both cases."

Flowering

This plant flowers during the latter part of the monsoon and early winter; but the white calycine leaf may be seen on the plant practically throughout the year.

Propagation of the plant can be easily effected through cuttings or through seeds; a deep, well-watered soil is best for *Mussaenda*, but the plant will thrive even in rather poor soil.

27. SOME OF THE COMMONER PALMS OF INDIA

To VISITORS coming to India by sea one of the most striking sights are the palm-fringed shores of our land. Should the visitor approach Bombay early in the morning, he may see the sun rise in all its colourful majesty from among the waving and welcoming arms of our coastal palms. Palms are indeed a fit subject for the loftiest poet, they are equally fit for the botanist, the sociologist, the man-in-the street. The present series would not be complete without some notes on the commoner palms of our country.

There is a beautiful book on the subject entitled *The Palms of British India and Ceylon*, by E. Blatter, published by Oxford University Press, from which book the illustrations accompanying this chapter have been taken with permission; interested readers are referred to Blatter's book for fuller details.

To help botanically minded readers to distinguish at once the main palms, the following key may be found useful.

KEY TO THE COMMONER PALMS OF INDIA

Leaves fan-like, about as broad as long..... *Borassus*
Leaves feather-like, much longer than broad:
  Stems above 30 cm. in diameter:
    Stems bulging above the middle, smooth and greyish in colour..... *Roystonea*
    Stems, if at all, bulging at about the middle or below, rough, brown or black:
      Stems very rough from the persistent bases of leaf stalks..... *Phoenix*
      Stems marked with ring-like leaf scars, but the bases of the leaf stalks not persistent..... *Cocos*
  Stems usually 15–20 cm. in diameter or less..... *Areca*

THE TAL PALM

BORASSUS FLABELLIFER Linn.

In English, this palm is known under the name of *Palmyra Palm:* in Hindi, Bengali, Marathi etc., it goes under the name of *Tal* or *Tar* or *Tad.*

This palm is indigenous in India; it is found from the Upper Ganges southwards to Cape Comorin and beyond. On the hills in the neighbourhood of Bombay, it is one of the commonest palm trees. *Borassus* is a Greek name meaning "the growing spadix of the date with immature fruit." Linne took the name to mean some sort of palm.

This palm may reach 20–30 m. in height, 50–75 cm. in diameter. Old stems are marked deeply by the scars of fallen leaves. The leaves are fan-like, 1–1.5 m. in diameter, stiff, the segments of the leaves being 60–80 in number, rigid, folded along the midrib; the petiole or leaf stalk is stout, 60–100 cm. long. The inflorescence of both male and female flowers is enveloped in a large bract or sheath, which is boat-like in shape. Floral branches are supplied abundantly with sap; the latter is sweet and tasty and comes out readily when the boat-like bract is slit at the end; the sap is gathered in earthenware pots, but soon ferments through the action of the many yeasts floating in the air. Fermented sap is the *Toddy* of commerce. The unfermented sap, *Neera,* is a refreshing and nourishing drink.

The Palmyra Palm is one of the most useful trees of India; its stems are used as house posts or roof beams; its leaves are used for thatching cottages in rural areas, and for making country 'umbrellas'. The fruit is small and jelly-like, but is very refreshing in the hot weather. All parts of the tree make good but fast-burning fuel. The unfermented sap or *Neera* seems to have special virtues when drunk early in the morning; the fermented juice, *Toddy,* "is almost as famous for its use

and notorious for its abuse" (Blatter). Sugar or jaggery is obtained by boiling the unfermented juice into a syrupy consistency and then allowing to cool and harden. Toddy, on the other hand, can be converted into vinegar. The young seedlings are used as vegetables particularly among the Kolis. In olden times leaves were used to write upon, but this practice does not hold at present, paper being cheaper and more readily available.

In many parts of India, this palm may reach 100 years of age and more; many trees, however, are damaged beyond repair by vultures, which make such trees their roosting place and kill the trees with their strong excrements. The tree also suffers on account of strangling by *Ficus*, which often throttles the palm to death.

"Both Hindus and Buddhists regard the Palmyra in veneration, probably because the sacred scriptures were, in ancient times, written on its leaves."[1]

THE FISH-TAIL OR SAGO PALM

CARYOTA URENS Linn.

In English this palm is known as the *fish-tail Palm* or *Indian Sago Palm;* in Hindi, it is known as *Mari;* in Mar., as *Birli Mhad. Caryota* from the Greek means 'nut-like'.

The stem is normally 6–10 m. high, but on occasions may reach 30 m., a little over 30 cm. in diameter, fairly smooth and grey. The leaves are about the largest of any Indian palm, they are bipinnate, up to 5 m. long, 3–4 m. broad; the leaflets are like a fish tail or fin, wedge-shaped, strongly nerved with parallel nerves, serrated at the tip. Fruits are 1.8 cm. across, stony.

[1] Benthall, *Trees of Calcutta*, p. 445.

Plate 21a. THE TAL PALM (*Borassus flabellifer* Linn.)
(*See page 103*)

Plate 21b. THE BETEL-NUT PALM (*Areca catechu* Linn.)
(*See page 106*)

Plate 21c. **THE WILD DATE PALM** (*Phoenix sylvestris* Roxb.)
(*See page 107*)

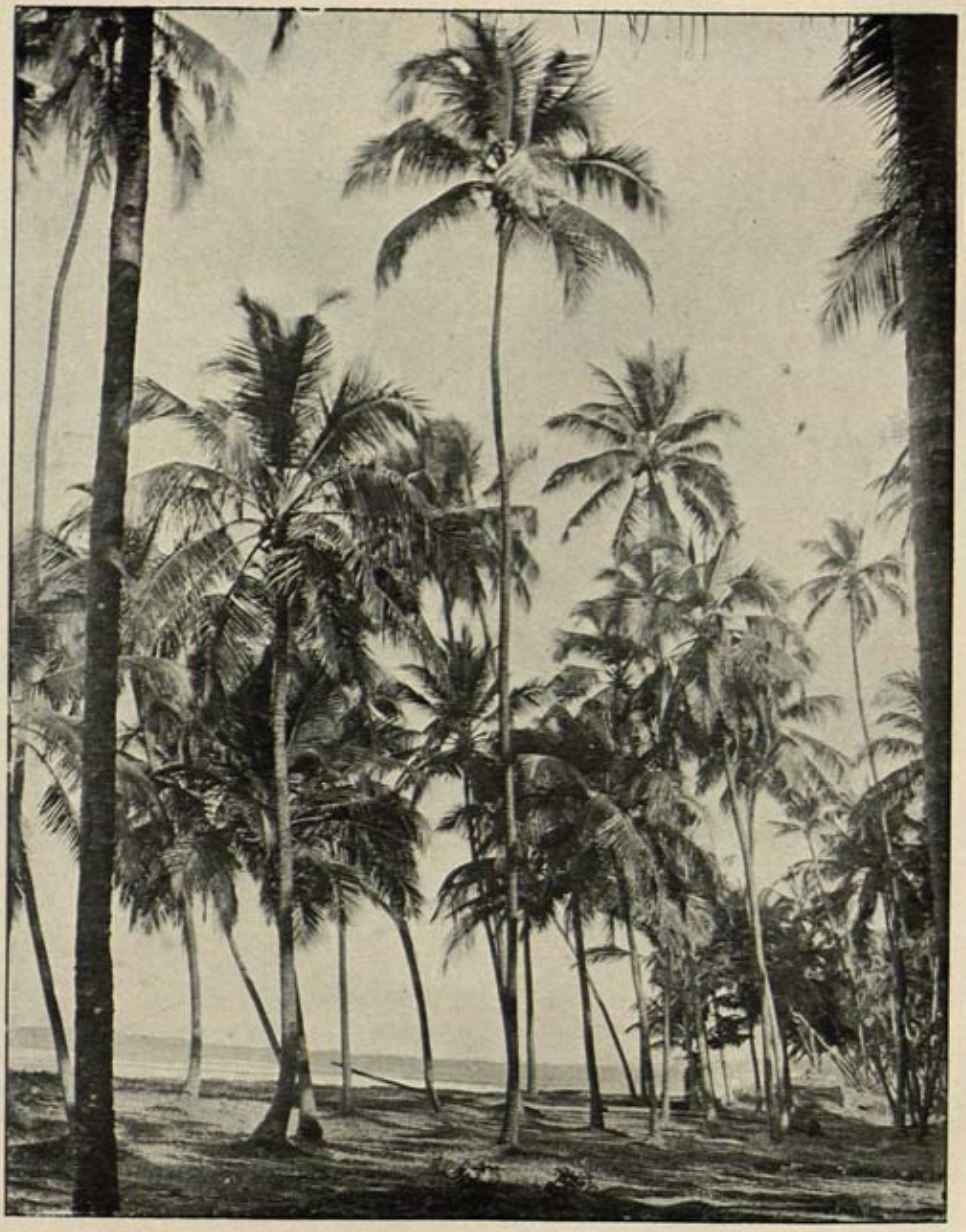

Plate21d. THE COCONUT PALM (*Cocos nucifera* Linn.)
(*See page 108*)

This palm is indigenous in India from the sub-Himalayan tracts to the south of India and beyond. It is one of the commonest wild palms on the Western Ghats. It is occasionally planted in gardens, where young plants are highly appreciated for their beauty.

Many important products are obtained from this tree. The fibres, particularly those of the leaf and flower stalks, are commercially employed to make very durable ropes, or for the preparation of rough brushes. From the pith of this palm a type of flour is obtained, which is almost equal to the best sago of commerce; this flour is much used by hill people in times of scarcity. Toddy is also obtained from the sap. The terminal young bud is edible. The timber is strong and durable. The scientific name *urens* (meaning 'burning') seems to have been given to this palm on account of the intense irritation caused on the skin when handling the fruits. Blatter remarks on the subject: "I have never tasted the fruit, but I remember that, some years back, I asked my students in Botany to dissect the fruit of Caryota. After a few minutes they gave it up, showing me their hands, which looked, indeed, as if they had been handling nettles. The victims of science felt the irritation for about two hours." On more than one occasion, I have myself tasted the fruit, and noted a very troublesome irritation in the tongue and mouth for several hours.

Young Caryota plants are most interesting for the garden or for large flower pots; the plant grows well on almost any type of soil, but does exceedingly well in good soil. Caryota "reaches its full size in about 15 years and about 7 years more are occupied in producing its flowers before it becomes unfit for the garden. The first flowering panicle is of immense size and pendulous from the axil of one of the upper leaves. The second is from a lower axil and somewhat smaller, and so on downwards until the tree is exhausted". (Woodrow). Old plants look generally wild and ragged; young seedlings up to the height of 3–4 m. are most elegant either in the garden or in

large wooden tubs; this is a very decorative plant.

It is worth mentioning that this was one of the first trees to be introduced into the Calcutta Botanic Garden by is founder, Col. R. Kyd, who hoped that Caryota could do much to increase the food supplies of the country. This palm has ever since remained an honoured guest in the Garden at Calcutta.

THE BETEL-NUT PALM

ARECA CATECHU Linn.

Hindi—*Supari;* Bengali—*Gua;* Tamil—*Kamugu.*

Areca is "a variant of a Tamil word meaning a cluster of nuts."[1]

In English this palm is known as *Areca-nut Palm* or *Betel Palm;* in various northern Indian languages, it is known as *Supari.* The original country of this palm is not known with certainty; it is cultivated along the coastal belt up to approximately 300 km. from the sea. The trunk is straight up to 30 m. high and 15 cm. thick. Leaves similar to those of the coconut palm, 1–1½ m. long. The fruit is more or less spherical 3–5 cm. across, smooth, reddish. The tree is cultivated for its nuts. In the collection of the nuts, farmers climb to the top of one tree, and gather its fruits, and then shake the tree sufficiently until they are able to get hold of the neighbouring trunk, and in this way, save themselves from going up-and-down those trees. Under cultivation areca-nut palms are planted rather close together in areas protected from strong winds and with the soil beneath covered with banana or other cultivated herbaceous plants that help to retain the moisture of the soil.

The fruit is an important article of commerce in India; it is used either by itself or mixed with tobacco wrapped in leaves

[1]Benthall, *Trees of Calcutta,* p. 457.

of the betel vine for chewing, all over the country. The wood of the tree is valuable, as it is hard. Leaves are used for thatching.

THE WILD DATE PALM

PHOENIX SYLVESTRIS Roxb.

Phoenix is from the Greek, meaning 'purple' an allusion to the fruit.

The *Wild Date Palm* is indigenous in India, but the persistent bases of the leaf petioles give it a very wild look, on account of which this palm is nowhere cultivated as an avenue or road-side tree. Economically the tree is important because of the sugary sap that can be concentrated into sugar, or fermented into liquor. The wild date possesses a large stone in the centre, surrounded by a tough skin, and little else.

THE MOUNTAIN GLORY

ROYSTONEA REGIA Cook.

This palm is listed in the literature under the name *Oreodoxa regia* Kunth; in English it is called *The Mountain Glory*, or *The Bottle Palm*. It is often cultivated in parks and avenues as one of the more elegant and stately of all the palms grown in this country. The stem is smooth and greyish, uniformly thick except for a slight bulge near the top below the leaves. Its original home seems to be Cuba in the West Indies, but it has now spread to the tropics of the whole world. In Cuba the fresh leaves are eaten as vegetables. I can find no mention of the exact date of its introduction into India; I find references

in the literature that in 1861 it was cultivated in gardens in Bombay; none of the provincial floras of India (except Bombay) mentions the plant before 1946, when Benthall listed it among his Calcutta trees.

THE COCONUT PALM

COCOS NUCIFERA Linn.

In the coastal parts of India, there is scarcely a tree that is better known to the general public than the coconut tree, *Cocos nucifera* Linn. Some details, however, may not be so well known, and this is why the tree is included in this series.

Origin

The coconut tree has been cultivated in India for centuries, so long in fact that all of us have come to look upon it as one of the more typically representative trees of the country. Authorities, however, are not yet agreed on its original home; it is not certain that the coconut tree is indigenous in India. All the other species of the genus *Cocos* are indigenous in South or Central America; for this reason it has been suggested that the coconut tree originated also in those parts of the world, from where fruits were many centuries ago carried all over the Pacific by sea currents, and finally were brought to India. This spreading of the coconut tree, moreover, must have taken place so many centuries ago that there is no record either in the written history or in the traditions of the islanders of the Pacific Ocean or of India.

Description

A tall, unbranched tree, 10–25 m. tall, straight or slightly curved, marked with ring-like leaf scars. The stem does not grow in thickness in the way of, for instance, the Mango tree,

but remains more or less uniformly 40–70 cm. thick throughout its length. Leaves are 2–4 m. long, feather-like in appearance, consisting of a stout axis on which are the numerous leaflets fixed; the leaflets form the green part of the leaf, they are over 100 in number, each being 60–80 cm. long and very tough or leathery, green in colour and shining. Flowers come out from a boat-like spathe or bract which is 60 cm. or more long; male flowers are scarcely 12 mm. across; female flowers may be about 25 mm. across and long. Fruits, the coconuts of commerce, are 20–30 cm. long, slightly less broad, somewhat three-sided. The outermost part of the fruit is green and shining when fresh, being almost entirely water-proof and very hard; beneath this, there is a thick layer of stout fibres, the layer being at times over 25 mm. in thickness, these fibres being the *Coir* fibres of commerce. There follows a hard, stone-like coat or layer, about 6 mm. thick. The inside of this stony layer is lined with a fairly thick coating of soft, milky-white flesh; the cavity inside the flesh is filled with a watery fluid, the *nariel pani* of the railway stations in Western India.

Cultivation

A ripe coconut can be made to germinate if planted with its husk in a bed of leaf mold in a moist and shady place; germination may be hastened by leaving the coconut in water in a well until the new roots begin to sprout out of the shell and its covering fibres. Seedlings are planted about 4–5 m. apart; the seedlings need plenty of water during the first few years. Healthy trees may begin to yield fruit within 5–7 years. For the garden the coconut tree is very elegant until it reaches a height that may be out of proportion with the rest of the garden.

Uses

There is scarcely a tree in nature that gives as many useful products as the Coconut palm. The manifold uses of the tree

are reflected in the numerous names, English and local, that are applied to the tree and its various parts. To mention but a few of these names, the tree itself is called in English *Coconut Palm*, in Marathi *Narel* or *Naril;* the wood is termed *Coco wood;* the brooms made from the leaf-ribs, *Goa-brooms;* the fermented sap is the *Palm Wine* or *Toddy*; the sugar from the sap, *Jaggery;* the nut itself, *Coconut;* the fibre from the outer rind of the nut, *Coir* or *Coir Fibre;* the water from the fruit, *Coconut water* or *Coconut Milk*, in local vernaculars *Nariel Pani;* the dry fleshy kernel, *Copra*, in Hindi *Khopra;* the oil extracted from the dry Copra, *Coconut Oil* or *Coconut Butter*, in Hindi *Narilkatel*, etc.

Among the uses to which some of the products of this tree are put, the following may be of interest to fashion-conscious readers, or to those elderly philosophers that may be searching for the elixir of eternal youth. Coconut water, taken internally or drunk has that "inestimable property . . . of clearing the face of all wrinkles and imperfections whatever, and imparting to it the rosy tints of youthful days."

As this short paper is not intended to be a guide to the commercial products of the Coconut Tree, we shall leave the discussion of such products to other writers. From the decorative point of view, this is one of the more elegant trees of the coastal parts of India; the fine avenues of palm trees that we can see in the northern parts of Bombay Island are beautiful beyond measure. These few notes, I hope, will help readers to identify the tree when they see it, should they be unfamiliar with *Cocos nucifera*.

In a recent note that I published in the *Journal of the Bombay Natural History Society*, I gave the translation of a letter from Fr. Stephens, the first English Jesuit to come to India; the letter was written to his brother in Paris, in October 1583. Some extracts of the letter may be cited here. "In this country there is a common tree . . . the so-called palm tree . . . This palm tree yields oil, wine (or toddy), milk and honey-sweet sugar, and

even vinegar; in addition it is used for the making of cordage and its leaves for the thatching of cottages to keep out the rain. It bears fruit throughout the year, not dates, but rather nuts like a man's head; stripped of the outer fibrous covering, the nut is about as large as two fists put together. Inside it has a liquid which is like light beer and is a refreshing drink; this is so abundant that after drinking the contents of one nut, you scarcely feel the need of another. The inside of the nut is lined with a white substance, which is quite tasty to eat. From the nut the village blacksmith gets his charcoal, whilst those who live along the sea shores transport to other places not just ship-loads, but mountains of the nuts stacked high round the sails, the cordage, and other fittings of the ship. Besides, the letters which people send to one another are nearly always written on the leaves of this palm-tree; further labourers working in the field scarcely use any other protection against the rains."

(The illustrations accompanying this chapter have been taken with permission from the book *The Palms of British India and Ceylon* by E. Blatter published by Oxford University Press.)

28. THE RUSTY SHIELD-BEARER

PELTOPHORUM PTEROCARPUM (DC.) Backer

(*Family*: Caesalpiniaceae)

Towards the end of April, many of the streets and roads in our cities are gay with masses of yellow flowers, which not only cover the trees with a colourful halo, but are also strewn on the ground beneath the trees to form a magic carpet of bright colours. The sight is all the more striking as this often is the only tree in flower at the time.

Names

The scientific name of this tree has lately been changed several times; in our floras it is known as *Peltophorum ferrugineum;* it also goes under the names of *P. inerme, P. roxburghii* or *P. pterocarpum;* all these names apply to the same tree. The common English name, *The Rusty Shield-Bearer* is the translation of the scientific name; *Peltophorum* or 'Shield-bearer' seems to refer to the scale or shield-like stigma of the flowers; *ferrugineum,* meaning 'rusty', refers to the rusty or reddish brown colour of the buds and fruits, both of which are conspicuous on the tree; on account of the colour of the pods, the tree is also sometimes referred to as *The Copper Pod,* the colour of the pod being rusty or old copper. *Pterocarpum* means 'with winged fruit'.

Original Home

The tree is indigenous from Ceylon southwards and eastwards through Malaya to the Northern parts of Australia. I have tried, though unsuccessfully, to find out when this tree was first introduced in India in general and in Bombay in particular. At the beginning of the 19th Century it was growing in the Calcutta Botanic Garden from seeds obtained from the Moluccas; apparently it had not set seed by 1814. No mention is made of this

Plate 22. THE RUSTY SHIELD-BEARER
(*Peltophorum pterocarpum* Backer)

tree in books dealing with Bombay trees published in the 19th Century; Graham's *Catalogue of the Plants Growing in Bombay and its Vicinity* (1839), Dalzell & Gibson's *Bombay Flora* (1861), and Nairne's *The Flowering Plants of Western India* (1894) do not list this tree among the indigenous or introduced ones of Bombay. It is indeed remarkable that in a little over 50 years *Peltophorum* has become so popular and so widely spread in Western India.

Description

This is a good avenue tree, growing in favourable conditions 10–15 m. tall, with spreading branches and dense foliage; along the streets of our towns, the shade of its leaves is most welcome during the hot months of the year. *Peltophorum* is a deciduous tree; it sheds its leaves during December and early January; young leaves come out soon afterwards, so that by the end of February the tree is fully covered with leaves. These are compound, 25 cm. or more long, consisting of a central stalk, along which there are 5–15 pairs of leaf-like pinnae; each pinna has a small stalk, 10–12 cm. long, and 10–12 or more pairs of small leaflets, which are rather stiff when old, at first bright green, later on deep or dark green, oblong, rounded or notched at the apex, and closely set among themselves. Flowers come out at the end of February, reach a peak in the middle of April, and may continue to bloom until well into the monsoon. At first buds appear on bare branchlets, at the end of most of the branches of the tree, forming large panicles or sprays; buds are rusty or olive-green outside and somewhat hairy; when the flowers open, the calyx parts fold back through the middle, and then the calyx is green or greenish in colour. Petals are bright yellow, about 25 mm. across when fully opened, their edges wavy or crisp, broad and more or less rounded at the apex, tapering into a narrow slender base. Stamens are ten in number, the anthers orange-yellow in colour, supported on slender filaments, which are hairy at the base. The stigma consists of a small, rounded

structure, usually green, supported on a long slender style; the stigma may be likened to a miniature inverted shield or to an umbrella. Pods are 5–10 cm. long, 18–20 mm. broad and somewhat thick; in colour they are of a rich old copper or rusty brown. Pods remain on the parent tree practically for the whole year, even when the tree is leafless, and by then they usually turn dull black.

Flowering Season

As stated above, normal flowering begins in the middle of February and continues until June; some trees come into flower somewhat later, and their flowers remain bright even after the arrrival of the monsoon. Some trees in Bombay come into a second burst of flowering at the end of the monsoon, the flowers lasting through October and November.

Cultivation

The easiest method is through seed, which is produced abundantly. Grow seeds in a seed-bed or in flower pots; transplant the seedlings when they are 1–2 m. tall. If it be difficult or impossible to water the young plants regularly, then it is best to plant them at the beginning of the monsoon. *Peltophorum* is often planted along streets mixed with the *Gulmohur* or with *Spathodea* or other red-flowered trees that may flower more or less at the same time; the results are very striking; masses of flowers with brilliant colours, yellow alternating with red or orange, make a very fine and colourful combination.

29. ASHOK

POLYALTHIA LONGIFOLIA (Sonn.) Thw.

(*Family*: Annonaceae)

Polyalthia longifolia is known in English as the *Indian Fir* or *Mast Tree;* in Indian vernaculars, the tree goes under the name of *Asopalav,* or simply *Ashok;* the latter name may cause some confusion, it being the name of the sacred tree *Saraca indica* (in older literature often referred to as *Jonesia asoka*). *Polyalthia* has been coined from the Greek, *Poly*=much or many, and *Althaino*=to heal or cure; *longifolia* means long-leaved.

Origin and Uses of the Tree

Polyalthia longifolia is indigenous in the southernmost parts of India and in Ceylon; it has been cultivated in Bombay for at least a century. In many parts of India this is considered a sacred tree, second only to the real *Ashok,* and for this reason it is often planted near Hindu temples. For the same reason many Hindus make the leaves into wreaths on festive occasions and hang them over their doors or about the house. The timber is fairly light and is used in parts of India to make drum cylinders. The fruits in times of scarcity are safely eaten by humans and at all times by birds or monkeys.

Description of the Tree

A tall and majestic evergreen tree, under good conditions reaching 15 m. and even higher. The leaves are rather tough when old, shaped like a narrow lance-head, hairless and shining on both sides; the margins are wavy; there is a central strong nerve going from the base to the apex and a number, 20–30, of faint, lateral oblique nerves. The shape of the leaves and the fact that they usually droop down suggest that the original home of *Polyalthia* is an area of heavy rainfall; due to the smooth

Plate 19. PERSIAN LILAC (*Melia azaderach* Linn.)
(*See page 93*)

Plate 23. **ASHOK** (*Polyalthia longifolia* (Sonn.) Thw.)
(*See page 116*)

surface and drooping of the leaves, the tree can easily shake off excessive water that may happen to rain upon it. Flowers are grouped in fascicles or bundles of 5–6; each flower is supported on a slender stalk 2–5 cm. long. The sepals are spreading and triangular in shape, much smaller than the petals, often scarcely 6 mm. long. Petals are green or greenish in colour, spreading, 2.5 cm. or more long, up to 6 mm. broad in the middle. Fruits are at first green, 18 mm. long, 12 mm. in diameter, crowded together in a fairly close bunch; at maturity fruits turn fairly deep purple. The tree flowers in February; it ripens its fruits in August–September.

Cultivation

Polyalthia is cultivated solely for its leaves, which make it a good shade or avenue tree; neither the flowers nor the fruits are striking for their colour or size. The growth of this tree is slow, and this means that its timber is sufficiently hard to stand the buffeting of the winds and rains of the monsoon. The seeds do not keep their vitality for long, so that it is usually necessary to plant them as soon as they are ripe. On the other hand the tree does not stand transplanting well, so that to obtain the best results it is best to plant the seeds directly in the site where the tree is going to grow, or with a little care they may be planted in baskets, and later on transplanted without injury to the delicate roots of the seedlings.

Note–A variety of this tree has of late become justly popular as an avenue tree: in this variety, branches do not spread out, but remain rather close to the main stem, so that the tree in general has a very elegant pyramidal look; it is being planted in gardens at the edge of lawns, or along paths. This variety has the elegant outline of the Everlasting Cypress of South Europe; but its long shiny leaves make this variety more pleasant than the Cypress.

30. PUTRANJIVA

PUTRANJIVA ROXBURGHII Wall.

(*Family*: Euphorbiaceae)

English—*The Lucky Bean Tree;* Hindi and Bengali—*Putranjiva, Jioysuta;* Marathi—*Patravanti, Jivputrak.*

Roxburgh in *Flora Indica,* Vol. 3, page 767, 1832, explains the name of the tree: "*Pootranjeeva,* the Sanskrit name *Pootra* signifies a son, and *Jeeva* as life. Dr. Berry of Madras informed me, the nuts are known, and sold in the bazar at that place by the very same appellation; and observed they are strung by parents, and put round the necks of their children to preserve them in health." *Roxburghii* refers to William Roxburgh, the first Superintendent of the Botanic Garden of Calcutta, after the founder, Robert Kyd.

Distribution

The tree is distributed all over India from the sub-Himalayan tracts through peninsular India down to Ceylon. Fairly common in parts of the Western Ghats, but nowhere abundant; often cultivated as an avenue tree in many parts of India. In the Indian Botanic Garden of Calcutta, one of the finest avenues is of *Putranjiva.*

Description

The tree under favourable conditions reaches up to 25 m. high with an erect straight trunk and a large spreading shady head composed of innumerable expanding branches; the young shoots may be more or less hairy, the rest of the tree is smooth and hairless. The leaves are leathery, and shining, in shape like a lance-head, usually wavy on the margins; young leaves are of a very pleasant light green. Old ones become darker and

shinier. Flowers are inconspicuous, unisexual, that means to say, the two sexes are found on different trees. In colour, they are yellow or yellowish, but on account of the rather small size, they are seldom noticed. The fruit is a drupe, 15–20 mm. long egg-shaped, fleshy, enclosing a rough surfaced very hard stone. The timber is fairly hard, and is used for turning.

Uses

The tree is cultivated all over India and in other tropical countries as a good avenue tree giving a close and pleasant shade. The leaves in some parts are used medicinally in the treatment of colds. Oil from the seeds is sometimes used for burning. Leaves are occasionally used as cattle fodder.

The tree has a high reputation in popular belief particularly as a protection against the evil eye especially in the case of children. Chains or rosaries made from the nuts are often used by Fakirs and other devout people as protection from evil.

Whatever be the effectiveness of the tree as a protection from evil, it is certainly a most graceful tree, which in our towns and along our roads gives excellent protection from the burning sun of summer.

31. KUSIM

SCHLEICHERA OLEOSA (Lour.) Oken

(*Family*: Sapindaceae)

English–*Lac Tree, Gum Lac Tree;* Hindi–*Kosom, Kusim;* Marathi–*Kusim;* Tamil–*Pava, Pu, Pulochhi.*

THE GENERIC name is after J. C. Schleicher, a Swiss Botanist; '*oleosa*' means oily or 'rich in oil' with reference to the oil contained in the seeds. In some older books the tree is listed as *Schleichera trijuga* Willd.; *trijuga* means 'with three pairs' or 'three yokes' and refers to the pairs of leaflets in a leaf.

DISTRIBUTION

From the foothills of the Himalayas southwards to Ceylon, abundant on the Western Ghats or in Central India in mixed deciduous forests, going eastwards through Burma to Java and Timor. An important and conspicuous forest constituent in many parts of India; young leaves are bright red in colour, and cause the tree to stand out brilliantly in any forest; older leaves become purple and then uniformly green; leaves turn yellow and fall off in December. It is commonly planted as a roadside tree especially in Central India.

DESCRIPTION

A tall deciduous tree, 10–15 m. or more in height. Leaves compound, with 2–4 pairs of leaflets on a strong rachis; leaflets elongated, the lower pair small, the upper pair two or three times longer. Flowers yellowish, in numerous spikes towards the ends of the branches from the axils of leaves. The fruit is elongated, with a number of hard blunt prickles. Seeds 1–2, covered with a fleshy whitish aril.

USES

This is said to be the most important lac tree of India,

Plate 24. KUSIM (*Schleichera oleosa* Oken)

the lac produced on it being of the most highly prized quality. The timber is hard and durable, and is used in oil and sugar mills, hand pestles, etc. The oil expressed from the seeds is valuable, used as an edible oil and in the soap and perfumery industry, it is considered by some to be the Macassar oil used in hair dressing. Young fruits are pickled; the whitish pulp covering the seed has a pleasant acid taste and is eaten as a cooling refreshment in the hot weather. Flowers appear with the new leaves at the beginning of the hot season; when the tree is in flower, it is visited by numerous insects, particularly bees. The so-called prickles of the fruit may be result of insect action; in the forest, I have examined fruits with prickles, and often found that the fruit was empty, the insect having destroyed the developing seeds. In February and March, the tree is as colourful as the Silk Cotton Tree, but the colour in the former is due to young leaves, in the latter to flowers.

32. THE TULIP TREE

SPATHODEA CAMPANULATA Beauv.

THIS TREE is well-known in English under the names of *Scarlet-bell, Fountain Tree* or *Squirt Tree;* at times it also goes under the name of *Tulip Tree.* All these names are very interesting as showing some of the more striking properties of the same. *Scarlet-bell* refers to the large and bright scarlet, bell-shaped flowers; *Fountain* or *Squirt* refers to the fact that when the buds are squeezed, they give out a quantity of water that comes out like a squirt. Finally the name *Tulip Tree* refers to the resemblance between the flowers of this tree and those of the tulip tree, a resemblance that, to say the least, needs a little imagination to see it; the flowers of this tree are decidedly irregular or asymmetrical at least near the base.

The scientific name *Spathodea* refers to the ladle-or spathe-like structure of the calyx; *campanulata* means bell-like.

There is no record of the time when this tree was first introduced into India; it was brought to Ceylon from Angola in Africa about 1873, and it seems quite possible that it came to us shortly after that date. The tree is indigenous in tropical Africa, but is now being cultivated all over the world in the tropics.

This is one of the more showy trees that have been introduced in India during the last century; it belongs to the family Bignoniaceae, which is remarkable for the large number of very showy trees and climbers that it possesses. In Bombay and other cities along the coasts of India, the tree flowers regularly but never with the profusion with which it does in Poona, Bangalore and other cities in the drier parts of the country. In such towns the tree is planted along many avenues, and it is one of the finest trees with a

straight trunk and a shield of flowers enveloping the top and lasting for several months.

Description

The tree in Bombay behaves like an evergreen one; in drier parts of the country, it may lose all its leaves for a short time during the hot weather. The wood is soft, and this is why the tree may be severely damaged by strong winds. Leaves are compound, that is to say, consisting of a number of leaflets, that themselves look like true leaves; their colour is rather deep green, and when not in flower the tree may look somewhat sombre. There are 4 to 8 pairs of leaflets and a terminal one in each leaf; they are opposite to each other, and may bear some glands at the base of the short petiole or stalk. Flower buds appear at the end of the cold season, and are rather striking in colour, being of a beautiful olive-green colour and velvety in structure; the buds appear in a close bunch at the ends of the branches, and usually are in large numbers and in various stages of development, the outermost in the bunch being further developed than the innermost.

This profusion of buds at the apex of practically every branch insures that the flowers may last for a long time on the tree. The calyx is boat-shaped, olive-green in colour, the sepals being distinguished only by the strong lines marking their edges and middle-lines.

The corolla consists of a short tube, which expands suddenly into a broad bell-shaped structure, the 'bell-handle' being somewhat lop-sided. The petals are fused together except at the very tip, forming a perfect cup; the upper rim of this cup may be smooth or crisped.

The colour of the flowers is of an overall bright scarlet; the base is light orange, the body bright crimson or scarlet, the rim may be tinged with yellow. There are four stamens on stout filaments just coming out of the rim of the corolla; the style is also stout and a little longer than the corolla itself.

Plate 25. THE TULIP TREE (*Spathodea campanulata* Beauv.)
(*See page 123*)

Plate 28. THE BHENDI TREE (*Thespesia populnea* Soland.)
(*See page 133*)

In its native country and in the hotter parts of India, the tree produces fruits quite readily; they are long pointed and woody with many winged seeds; in Bombay, I have never seen the fruits, nor apparently has any of the collectors who have left their specimens in Blatter Herbarium. This absence of fruits introduces some complications in the reproduction of the tree; in Bombay this is usually done through root suckers that are often quite abundant.

Flowering Times

In tropical Africa this tree flowers from September to May; in Bombay it flowers throughout the cold season and early part of summer, and often also surviving the monsoon months.

This is one of the finest avenue trees; but to get the best effect from it, the tree should be planted in well-drained soil; it thrives up to elevations of 1500 m., but it does well also at sea-level.

33. THE TAMARIND TREE

TAMARINDUS INDICA Linn.

(*Family:* Caesalpiniaceae)

English—*Tamarind Tree;* Hindi and Bengali—*Amli* or *Ambli;* Marathi—*Chinch;* Tamil—*Puli;* Telugu—*Chinta.*

THE NAME, Tamarind, comes from the Persian, *Tamar-i-Hind,* and means Indian date. The specific name, *indica,* refers to the supposed Indian origin of the tree; it is now commonly held that the tree is African in origin, but is cultivated in most tropical countries.

DESCRIPTION

The tamarind tree is a handsome evergreen tree and grows to large sizes. In young trees the trunk is straight and shapely; in older trees the trunk may become abnormally and irregularly thick, especially if the tree has been roughly treated as is most often the case. Leaves are compound, consisting of many small leaflets, and grow so densely on the tree that they cast an unbroken and pleasant shade on the ground. Young leaves are light green; older ones lose their brilliancy, but remain still very pleasantly green. Flowers are small, in small loose clusters among the leaves; the petals are variegated yellow and red, three of them being normal, two reduced to scales. Flowers come out in great abundance, so that by flowering time the ground beneath the tamarind tree is covered with a dense and colourful carpet of petals. The pod is curved, irregularly swollen, brown in colour, and contains several seeds immersed in fibrous pulp.

DISTRIBUTION AND USES

The tamarind tree is believed to be native in Abyssinia and Central Africa, whence it came to India; but this coming

Plate 26. THE TAMARIND TREE (*Tamarindus indica* Linn.)

must have been so long ago that there is no record whatever of the same. The tamarind is planted along street and roads; it is found in small groves in the forest, but such groves do not show that the tree is indigenous in India, they simply mark the sites of abandoned villages. Tamarind thrives all over India, but does not bear flowers or fruits in the Punjab and other northern parts of the country.

In some parts of India the tree is considered an ill-omened tree, and is treated with superstitious awe by our people; the tamarind is supposed to be the abode of malevolent spirits which are believed to be ready to do harm to any persons going to sleep under the shade of the tree. Perhaps on account of the acid contained in the leaves, most other plants do not thrive under the shade of the tamarind; this may have given rise to the popular belief about the danger of sleeping in its shade.

Tamarind is a very beautiful road-side tree; some colourful road stretches may be seen all over Madras State, particularly in the neighbourhood of Coimbatore. The timber is hard and difficult to work, and so is only used to make mallets or rice-pounders and the like. The fruit is a very important article of commerce, both for home consumption and for foreign export. The pulp is fairly acid, and forms one of the favourite constituents of curries in India. Seeds are eaten in time of scarcity. The seeds ground to powder and boiled with gum are said to make one of the strongest wood cements. Young leaves are eaten as vegetables. Medicinally several parts of the tree are said to be tonic and astringent.

One of my most vivid experiences, shortly after as a young man I arrived in India, refers to the pulp of the tamarind. I was trying to clean and polish some brass musical instruments, and asked a friend how to do it; he advised me to apply to our cook for the pulp of tamarind, but warned me that after rubbing the brass instrument with the pulp, I should wash thoroughly with water and dry the instrument. The result

was a brilliant polish for the brass instruments. But then I asked my friend what the cook was supposed to do with such polishing materials; I then learnt that the pulp of tamarind was used in curries, and I smiled thinking of the beautiful polish of mouth and digestive tract of any one eating tamarind curry. In due time I have come to appreciate curry made of the fruit of the tamarind.

The following paragraph is a free translation of a passage in a book on the natural and medicinal history of plants of Java by Jacob Bontius, published in 1658; in chapter 6, page 93, he writes on one of the uses made of the Tamarind: "I cannot pass in silence how we produce our daily drink from sugar and tamarind, in this fashion: A vessel well bound with iron bands is filled with about 30 jugs of river water, to which are added 2 lbs. of black Javanese sugar, 2 ounces of tamarinds, and two freshly cut lemons. All these are well crushed and mixed and then placed in a shaded spot for twenty four hours. It is marvellous how these things ferment together among themselves and without fire boil noisily, just as beer vats do in Holland; if a good fire is placed under the vessel, it causes the vessel to boil and to push all the impurities and dirt to the surface. This to the Javanese and to our people stands for beer, which is of a delicate flavour and is in no way inferior to Dutch beer and is by far more healthy in these hot climates. And truly, if an option between the two be given to me, I shall confess myself happy with this Julep . . ."

34. THE TEAK TREE

TECTONA GRANDIS Linn. f.

(*Family:* Verbenaceae)

English—*Teak Tree;* Hindi—*Sagun;* Marathi—*Sag, Sagwan, Tekku;* Bengali—*Saguna;* Tamil—*Tekku.*

THE NAME *Tectona* is said by Benthall to be derived from the Greek 'tekton', meaning a carpenter. *Grandis* means 'large', and refers to the size of the tree.

DISTRIBUTION

Teak is indigenous in India and Burma eastwards to Java. In India the natural northern limit is a line drawn from the Aravallies in Rajasthan eastward to Jhansi district, then south eastwards to the Mahanadi. It was introduced in Ceylon in 1680. It has been cultivated in the Gir Forest in Saurashtra for a long time. Burma is the home of teak of the highest quality; in India, North Kanara and the Dangs Forest produce teak of very good quality. Teak is occasionally found in India as a road-side tree; but it is not a favourite one, mostly because of the bare and wild look of the tree during the summer months when the tree is leafless.

DESCRIPTION

A deciduous tree reaching very large sizes; in the Dangs and North Kanara, I have often seen trees over 30 m. tall; records from other parts of India and Burma mention trees 60 m. or more tall. Young branches are quadrangular, downy or hairy. Leaves opposite, 30–60 cm. long and 15–30 cm. broad; in young seedlings leaves are much larger, size of a small umbrella. Leaves rough but hairless above, densely covered with reddish down beneath. Flowers come in great numbers in lax clusters at the ends of branches, they are white, and

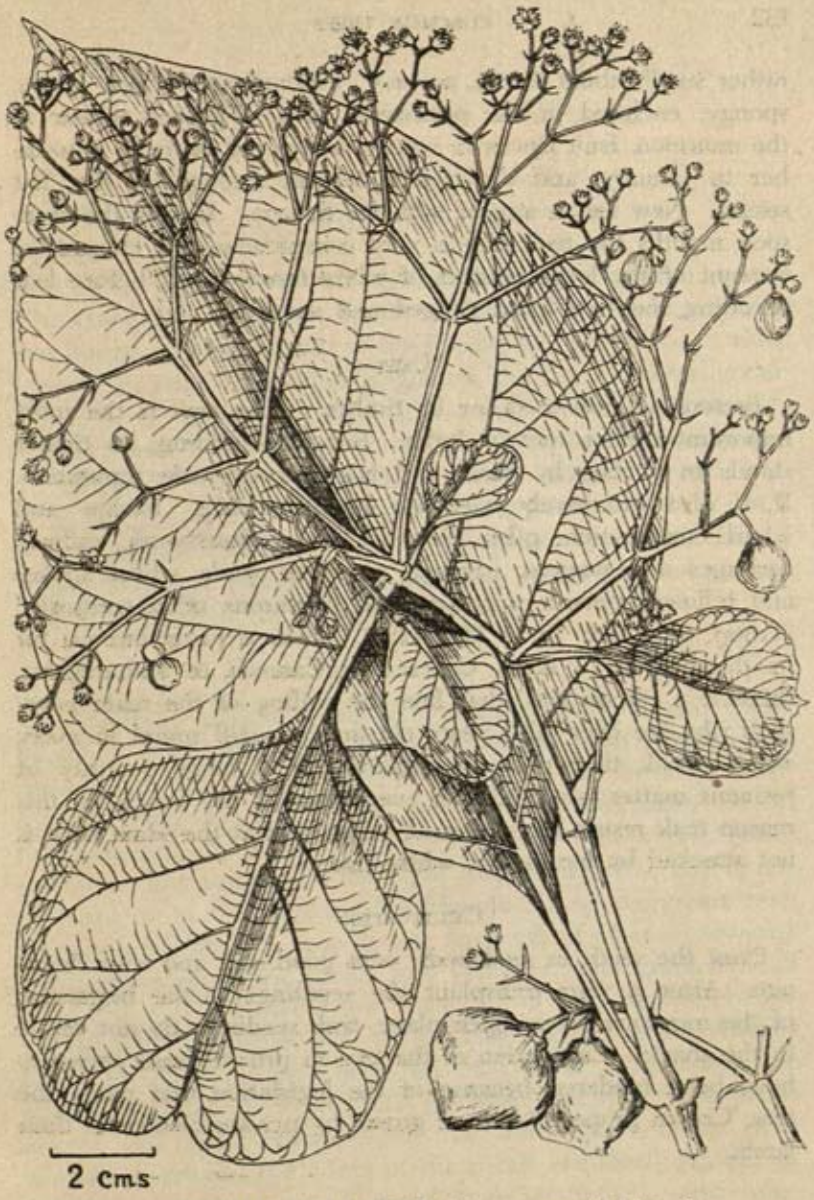

Plate 27. THE TEAK TREE (*Tectona grandis* Linn. f.)

rather small (about 6 mm. across). Fruit about 15 mm. across, spongy, enclosed in the persistent calyx. Flowers appear in the monsoon, fruit ripens in winter; leaves fall off from November to January, and the tree is leafless throughout the hot season. New leaves appear with the flowers. During the monsoon months the teak tree is very conspicuous and elegant on account of the large clusters of white flowers; just before leaf shedding the tree looks rugged and savage.

Uses

Tectona is cultivated for its timber. "The teak is the most important timber tree of India. For ship-building, its timber stands in a class by itself, and has a world-wide reputation. It is also extensively used for house-building, bridge and wharf construction, piles, furniture and cabinet-work, railway carriages and wagons, carving, ordnance work, wheel spokes and felloes, general carpentry, and numerous other purposes" (Troup, Silv. Ind. Tr. 2: 698, 1921). Teak is justly famous for its durability. In Karla Caves near Lanovla in Maharashtra, there is a set of 'ribs' that line the ceiling of the main cave; such ribs are over 2000 years old and are still sound in every sense. Teak timber is impregnated by a large quantity of resinous matter which fills up every pore of the wood; for this reason teak resists the action of water, and at the same time is not attacked by termites or white ants.

Cultivation

Plant the seeds in seed beds, with good soil, and easy drainage. After a year transplant the seedlings at the beginning of the monsoon, to an open place; teak seedlings do not thrive in the shade. Cultivation of the tree in private lands seems to have been hindered because of the legislation that made the tree 'Crown property' even if grown by private owners in their lands.

35. THE BHENDI TREE

THESPESIA POPULNEA Soland.

(*Family:* Malvaceae)

THIS IS one of the finest among our indigenous trees; it grows wild along the sea coasts from the Konkan southwards going into Burma and the Islands of the Pacific and westwards to East Africa. In Hindi and other languages, the tree is known under the name of *Bhendi;* in English it goes under several names, such as *Portia Tree, Bhendi Tree, Tulip Tree,* or *Umbrella Tree.* The scientific name, *Thespesia,* in Greek means 'divine' and refers to the fact that the tree was first noticed by Captain Cook in the neighbourhood of temples in Tahiti; *populnea* means 'poplar-like' and refers to the shape of the leaves, which are similar to those of the European poplar.

DESCRIPTION

A small to medium-sized tree, with a straight grey trunk; branches are closely set and form a dense crown, hence the name 'Umbrella Tree' in English. Leaves are broadly heart-shaped, somewhat stiff, 7–14 cm. long and alternately set on the branches; the apex of the leaf tapers into a fine point, somewhat like the leaf of the Pipal tree, though the 'tail' is not so clear as in the latter. The Bhendi is an evergreen tree; leaves do fall off, but they do not come off all at once; towards February many of the leaves turn yellowish, and gradually fall from the tree. Flowers are showy, 7–9 cm. across, bright yellow with a purple 'eye' at the base inside; as the flowers turn old, they become brick-red or pinkish in colour. The calyx is cup-like in shape, green in colour and stiff. The petals are at first pale lemon-yellow, the base inside being deep maroon or purple; the edges of the petals are nicely fringed or crinkled. Stamens are all fused together into a long tube,

which is reddish or purplish, the anthers being of a rich golden colour; through this tube the style comes out and splits into five branches or stigmas. The fruit is globular, supported in the cup of the calyx; at first the fruit is green, gradually it turns brown and finally black. Each fruit contains several seeds, 5–15 in all, which are oval in shape and are covered with fine down.

Flowering

This tree flowers more or less throughout the year, but especially during the cold season.

Gardening

Although the Bhendi is indigenous along the coastal areas, it does sufficiently well in other parts also; this is why it is often planted along streets, roads or even in gardens. It is a valuable tree both for shade and for decoration. As for soil, it does best on light porous soil, this is why it grows so well along sandy coasts. It is a quick growing tree; it may be planted from seeds or from cuttings, but in general small cuttings give the best results, as larger ones seem more liable to decay.

Economic Uses

The timber is of good quality; it is tough, fine-grained and resistant to water; this is why it is often used for the manufacture of domestic appliances, such as cart-wheels, boxes, etc., and for boats. The bark yields a fine fibre, which, however, in India is seldom used commercially; in other parts of the world, the fibre is used very much like we use jute fibre, for the manufacture of gunny bags, etc., or for preparing rough and strong cordage. Most parts of the tree, but especially the bark of the trunk and branches, contain appreciable amounts of tannin and a fine red colouring matter, but neither of these substances is commercially exploited in this country.

Medicinal Properties

The fruit, leaves and roots are made into a paste, which is sometimes used in the treatment of various skin diseases, though there is much doubt about the value of such treatment. The bark is astringent, and is used in cases of diarrhoea and similar diseases.

There is, however, no doubt about the value of the Bhendi as a road-side tree; this is why it has been introduced into most of the tropical countries of the world.

36. THE TOON TREE

TOONA CILIATA Roem.

(*Family:* Meliaceae)

English—*Toon, Indian Mahogany, Moulmein Cedar;* Hindi—*Tun, Tun-ka-jhar;* Bengali—*Tun;* Marathi—*Tun, Kunant, Nim;* Tamil —*Tun-maram;* Telugu—*Nandi.*

TOONA IS the latinized Indian name Tun. "Ciliata" refers to the cilia or stoutish hairs at edges of calyx and corolla. In many of our floras the tree goes under the name of *Cedrela toona;* but Roemer in 1846 showed that the true *Cedrela* trees are exclusively American; our Old World trees have been placed under *Toona.*

DESCRIPTION

A tall elegant tree with numerous branches which give the tree a shady head. Leaves pinnate, with a strong rachis and numerous leaflets on either side arranged in pairs. Flowers white, sweet-scented, in drooping open clusters at the ends of branchlets. Stamens inserted on a round orange-coloured disc. Fruits are an oblong capsule 2–2.5 cm. long; seeds numerous, flat, with a membranous wing at each end.

DISTRIBUTION

This tree is common all over India especially in hilly areas, going up to 1000 m. elevation. It is often planted as a street or road-side shade tree. In the North Kanara Forests this is a common tree, and there it is reported attaining a height of 30 m. or more (100 ft.). The tree is found eastwards from India through Malaya and Australia.

USES

There are few trees in India more useful than this. The

Plate 29. THE TOON TREE (*Toona ciliata* Roem.)

wood is reddish in colour and scented; it is not attacked by white ants, and is used for structural purposes, cabinet work, and is at present the main timber used for cigar boxes. The flowers yield a red and yellow dye, which, however, is of little commercial importance at present, due to its being somewhat unstable. The seeds and leaves are used as cattle fodder. The bark is said to be a powerful astringent.

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